

ASTRONOMICAL OBSERVATIONS

MADE AT THE

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UNIVERSITY OBSERVATORY

OXFORD

UNDER THE DIRECTION OF

C. PRITCHARD, M.A., F.R.S., F.G.S., F.R.A.S.

SAVILIAN PROFESSOR OF ASTRONOMY IN OXFORD

No. I

Oxford

AT THE CLARENDON PRESS

M.DCCC.LXXVIII



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*PUBLISHERS TO THE UNIVERSITY OF*

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## INTRODUCTION.

THE Oxford University Observatory referred to in the following pages was erected at the expense of the University of Oxford, and was so far in readiness by the autumn of 1875 that observations were then commenced, and are here recorded up to Dec. 31, 1877.

The building itself has been sufficiently described in the 'Monthly Notices' of the Royal Astronomical Society for December, 1873—a publication so universally accessible to astronomers as to render it unnecessary here to enter upon further details. It may, however, be proper to explain that the objects for which the institution has been established are twofold. The main and fundamental intention is to provide the University students with the means of efficient instruction in practical astronomy, while at the same time the Professor shall have at his disposal adequate instrumental appliances for extending the science by actual observation.

The instrument with which the observations were made is an achromatic telescope of twelve-and-a-quarter inches aperture, and one hundred and seventy-five inches focal length, mounted equatorially, and provided with all the accessories suggested by the present state of astronomical and constructional science. The quality of the object-glass has been very carefully scrutinized, and to the extent of a circle of at least twenty minutes of arc in diameter, and centrically situated, there has been no distortion detected in the telescopic field of view amounting to one-tenth of a second of arc. By means of a peculiar form of micrometer recently devised by the Professor and attached to the telescope, it is possible to measure differences of celestial arcs in any direction to the extent and very approximately to the accuracy just described, and what is of equal importance there is no restriction in the magnifying power applied to the micrometer, beyond that imposed by the quality of the object-glass, and the state of the atmosphere. Furnished with this micrometer the

measuring capacity of the telescope probably approaches to that of the heliometer. The entire instrumental equipment has been executed by Mr. Howard Grubb, of Dublin, and it is a highly satisfactory instance of his well-known skill.

The greater part of the observations recorded in this fasciculus were made with an ordinary filar micrometer, previously tested by the usual methods, the new micrometer referred to above having been only recently completed.

The record of the observations has been divided into four distinct parts. Part I contains three somewhat extensive series of observations of the Satellites of Saturn during the last three oppositions of the planet, and it is confidently hoped that they may be of service to some astronomer who shall undertake a re-investigation of the orbits of the Satellites. The methods of observation adopted will be found detailed on page 2. Grateful acknowledgment is due to Mr. Albert Marth for the valuable and accurate ephemerides of the satellites which he has regularly supplied. It is not proposed at present to continue these observations.

Part II contains four hundred observations of double stars. For reasons shortly to be explained it is in future proposed to restrict the observations to a small and select number of stars only, but these few will be frequently observed, and with great care.

Part III contains a considerable series of observations of all the comets discovered in the year 1877. They were regularly observed at Oxford from the day of the first telegraphic intimation of their discovery until they disappeared from our view. Approximate elements of their several orbits were computed as soon as possible, and in most instances an ephemeris was communicated to astronomers possessing adequate means of observation.

Very many of the comet observations have been made by means of a peculiar reticule originally devised by Mr. Hind, for the purpose of procuring rapid and approximate observation of the stars whose places are delineated on his Ecliptical Charts. It has been found to possess considerable practical utility. These observations are marked G, from the form of the instrument which somewhat resembles a gridiron. The rest were made with the Filar Micrometer, and are marked F.

Part III also contains the elements of the orbits of the comets that have been observed at Oxford, together with an ephemeris of Winnecke's Comet, with which the observations themselves have been compared. So soon

as this Observatory is provided with a suitable meridian instrument, it is proposed to re-observe the comparison stars, but until this is done it seems useless labour to attempt the computation of normal places, and the determination of the final elements of the orbit.

Part IV contains the elements of the orbits of three double stars, selected from a larger number already computed. Considerable pains have been bestowed upon the calculation of these orbits, and the method employed is somewhat different from that usually adopted. In the first instance an approximate orbit is obtained by the graphical method proposed by Sir John Herschel. This being effected with as much accuracy as that method admits, a comparison is made between the places of the companion on the elliptical orbit thus obtained, and the correct places designated by the interpolation curves. Five places are then selected either on, or very near to, the ellipse itself, or, more generally, five places are selected intermediate between the curve and the places as given by the interpolation curve; the elements of the ellipse are then accurately *computed* by an algebraical process from these five places thus selected. The method thus adopted appears to have the advantage of a species of second approximation, and in its results has so far proved itself to be an improvement on the simply graphical method. A judgment on this head may be formed from the record, here made, of the comparison of the computed places with those given by the interpolation curves.

While engaged on this very interesting but very troublesome work, I have been repeatedly struck with the conflicting nature of the observational results; no doubt the observations are in themselves sufficiently difficult, but the discrepancies between different observers even of repute and experience, are often excessive, and might be termed even wild. Hence, I have reluctantly come to the conclusion that the *accurate* determination of the orbit of a double star remains for the astronomy of the future. The contribution of the University Observatory towards this object, will be made by careful and often repeated observations of a very few double stars included in a selected list. Every astronomer who has been engaged in computations of this description, must have a full appreciation of what would often be the value of one single pair of co-ordinates at a prescribed epoch, if only implicitly reliable.

Some observations have been attempted of the newly discovered satellites of Mars, but as they must be regarded as approximate only it

has not been thought desirable to enter them here. The aperture of the Oxford telescope, considerable as it is, is hardly sufficient to cope successfully with objects so faintly illuminated.

Independently of the foregoing work, the attention of the Observatory has been diligently directed to the photography of the moon. Nearly twelve hundred measurable photographs have been secured by means of Dr. De La Rue's admirable reflector, which he presented to the University, and erected in the eastern dome. From the same generous quarter, has recently been received a very beautiful engine for completing the measurement of the forementioned photographs. It is hoped that in due time, and by means of this instrument, the amount of the moon's physical libration may be ascertained, if any exists to an appreciable extent.

I will only add that the affairs of the Observatory are under the control of a Board of Visitors consisting of the following members:—The Vice-Chancellor, the Proctors, the Astronomer Royal, the Director of the Cambridge Observatory, the Radcliffe Observer, and four other members elected by the Convocation of the University, viz.:—Warren De La Rue, D.C.L., Professor Bartholomew Price, J. A. Dale, M.A., and W. Esson, M.A.

There are two assistant astronomers attached to the Observatory, Mr. William Edward Plummer, and Mr. Charles Augustus Jenkins. The greater part of the observations herein recorded were made by the first assistant; those taken by the second assistant are marked thus †. The lunar photographs referred to have been taken exclusively by the latter. The assiduity and skill with which the assistants have done their work, will be sufficiently attested by the fact that it is but little more than two years ago, that the observations were begun, and that they have been reduced and are here recorded up to the commencement of the present year.

The geographical position of the Observatory, as given in a communication from the Ordnance Survey Department, under the direction of Col. Sir H. James, is as follows:—

Longitude West of Greenwich	$1^{\circ} 15' 5.99''$
North Latitude	$51^{\circ} 45' 34.152''$

CHARLES PRITCHARD.

OXFORD UNIVERSITY OBSERVATORY,  
*April 8, 1878.*



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I.

OBSERVATIONS

OF

SATURN'S SATELLITES

AT THE OPPOSITIONS OF

1875-6-7.

THE method at first adopted for measuring the co-ordinates of Saturn's Satellites was to bisect the disc of the planet by estimation, and then measure the distance of the satellite from the estimated centre, but after a short time this method left an unsatisfactory impression on the observer's mind, and henceforth the measures were taken from each limb of the planet. In some cases when the satellite was too near the limb of the planet to admit of certainty of measure, the distance was taken from the further limb, and then the diameter of the planet itself was measured under the same conditions in which the satellite was observed. The consequent corrections are always given in the notes. In some cases a correction for refraction is necessary; the amount, in all cases where it is at all appreciable, has been given and has been applied to the observed co-ordinates, not as being warranted by the minute accuracy of the former, but as a system. The very minute correction for defective illumination has not been applied.

The number given in the column headed 'Weight' is the numerator of a fraction whose denominator is 5. When no number is given, but ... inserted, it is to be understood that the observation is entitled to full weight.

1875.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Enceladus.</b>									
	h. m.	"		h. m.	"		"	"	
Sept. 17	22 8.9	+ 37.98	4	...	...	...	...	...	2
Oct. 5	19 47.3	+ 37.55	4	19 57.4	+ 5.52	4	...	0.01	2
6	20 33.9	+ 14.54	3	...	...	...	...	...	1
<b>Tethys.</b>									
Sept. 14	20 18.9	+ 14.64	3	20 27.4	- 6.78	3	...	0.01	4
15	20 46.2	- 26.24	4	20 38.8	+ 4.30	4	...	...	...
16	20 17.1	+ 31.12	3	21 5.2	- 1.88	3	...	...	2
17	22 33.9	- 43.12	4	...	...	...	...	...	2
Oct. 2	20 12.0	- 15.19	4	20 25.1	+ 6.77	3	...	0.01	1
5	20 23.6	+ 37.65	4	20 40.4	- 0.89	4	...	...	...
6	21 10.3	+ 44.35	3	21 21.5	- 0.67	3	...	...	...
11	22 2.3	+ 34.82	3	21 50.3	+ 11.78	3	...	0.02	4
<b>Dione.</b>									
Sept. 11	20 37.7	- 53.84	5	20 24.6	- 12.13	4	...	0.02	2
14	19 57.3	- 32.10	4	20 4.6	- 15.39	3	0.01	0.03	...
15	20 18.6	+ 58.38	5	20 28.5	+ 8.10	4	...	0.02	4
16	21 17.9	- 50.27	4	21 29.8	+ 0.06	3	...	...	4
17	22 13.6	+ 12.77	4	20 5.3	- 12.53	2	...	0.02	...
29	20 48.5	+ 38.00	4	20 56.6	+ 14.70	4	...	0.03	...
Oct. 2	20 36.4	+ 5.55	4	20 47.3	+ 13.48	5	...	0.03	1
5	20 16.3	- 23.81	4	20 4.7	+ 9.30	3	...	0.02	...
6	21 3.4	+ 18.93	2	20 55.6	- 15.00	2	...	0.03	...
11	22 17.2	- 53.64	3	22 53.5	- 9.62	3	...	0.02	3
15	21 38.6	+ 58.07	3	21 30.2	+ 5.56	3	...	0.01	...
16	21 3.1	- 32.11	4	...	...	...	...	...	1

**Enceladus.**

Oct. 5. The observations of declination are from the south limb only: a semidiameter of 9".60 has been applied.

Oct. 6. The observations are from the following limb only, and a semidiameter of 10".16 has been applied: possibly a fixed star.

**Tethys.**

Sept. 16 and 17. Interrupted by clouds.

Oct. 2. The planet badly defined.

Oct. 6. The image tremulous.

Oct. 5 and 11. The declination observations are from the south limb: a semidiameter of 9".23 and of 9".60 has been applied in each case, respectively.

**Dione.**

Sept. 11. Strong moonlight.

Oct. 2. Planet badly defined.

Oct. 11. The observations of declination were made from the north limb only: a semidiameter of 9".23 has been applied.

Oct. 16. The satellite faint and the planet tremulous: clouds.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

## Micrometer-Measures of Saturn's Satellites

1875.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Rhea.</b>									
	h. m.	"		h. m.	"		"	"	
Sept. 11	20 0.8	— 34.96	4	20 6.7	— 21.16	...	0.01	0.04	...
14	19 45.0	— 43.88	3	19 26.6	+ 11.57	...	0.01	0.03	4
15	19 30.6	— 78.11	3	19 24.9	— 14.45	...	0.01	0.03	...
16	20 7.9	+ 18.31	3	20 4.1	— 16.49	...	0.01	0.03	2
17	19 42.0	+ 83.85	4	19 51.8	+ 7.16	...	...	0.02	...
<hr/>									
25	20 32.6	+ 13.24	4	20 39.3	— 18.44	...	...	0.03	2
27	20 4.2	+ 17.88	4	19 58.3	+ 20.19	...	0.01	0.04	...
29	20 39.4	— 44.02	4	20 34.1	— 20.85	...	0.01	0.04	4
Oct. 2	20 3.4	— 33.96	4	19 57.5	+ 14.18	...	0.01	0.03	4
5	21 45.1	+ 81.27	4	21 37.0	— 8.26	...	...	0.02	...
<hr/>									
6	20 43.3	+ 21.22	3	20 50.2	+ 21.04	...	...	0.04	...
8	20 36.9	— 48.64	3	20 44.2	— 20.31	...	...	0.04	1
11	21 12.1	— 32.09	4	20 25.6	+ 14.79	...	...	0.03	1
15	21 15.5	+ 24.01	3	21 22.6	+ 21.68	...	...	0.03	...
16	23 13.2	— 73.82	4	23 3.4	— 0.38	...	...	0.00	...
<hr/>									
<b>Titan.</b>									
Sept. 6	19 16.4	+ 152.43	3	19 23.0	+ 39.17	3	0.05	0.13	...
7	19 15.1	+ 94.02	3	19 19.7	+ 47.45	3	0.07	0.15	4
11	19 5.0	— 174.50	4	19 16.6	+ 2.89	4	...	...	...
14	19 10.7	— 162.05	3	19 20.4	— 43.81	3	0.07	0.14	4
15	19 13.4	— 104.79	4	19 19.0	— 49.50	3	0.08	0.17	...
<hr/>									
16	19 2.4	— 35.16	4	19 18.4	— 48.96	4	0.08	0.17	2
17	19 15.7	+ 39.24	4	19 22.4	— 40.79	4	0.05	0.13	...
18	20 14.6	+ 111.06	6	20 38.9	— 25.42	6	0.01	0.06	1
25	19 56.5	— 61.62	4	20 5.2	+ 35.64	4	0.02	0.09	...
27	20 37.0	— 175.65	4	...	...	...	...	...	2

## Rhea.

Sept. 16 and 25. Observations made between clouds.

Oct. 8. The image of the planet bad, and some clouds.

Oct. 11. The definition of the planet very bad. sky generally hazy.

## Titan.

Sept. 16. Saturn low and diffused: the satellite very faint and observed over illuminated wires.

Sept. 18. Illuminated wires employed: the individual measures discordant.

Sept. 27 and 30. Further observation prevented by clouds.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1875.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Titan</b> (continued).									
	h. m.	"		h. m.	"				
Sept. 29	20 14.2	- 187.70	4	19 21.6	- 31.00	3	0.02	0.09	4
29	21 21.1	- 185.89	4	...	...	...	...	...	...
30	19 34.0	- 156.38	3	...	...	...	0.03	...	2
Oct. 2	19 47.4	- 29.72	4	19 52.7	- 47.91	4	0.04	0.11	...
5	21 3.7	+ 160.50	4	...	...	...	...	...	...
5	21 55.6	+ 163.43	4	22 4.9	- 35.50	3	...	...	3
6	21 32.9	+ 183.20	4	21 59.7	- 13.70	3	...	0.02	3
11	20 6.0	- 64.00	3	20 13.2	+ 35.33	3	0.02	0.08	4
16	21 31.8	- 148.05	5	22 56.3	- 45.45	...	...	0.11	2
<b>Japetus.</b>									
Sept. 7	20 44.0	- 449.50	3	20 57.2	- 8.76	2	...	0.01	1
10	20 37.0	- 352.52	3	20 58.7	- 14.00	1	...	0.03	...
14	21 2.4	- 198.03	4	20 49.4	- 18.70	2	...	0.03	1
15	19 46.1	- 155.48	7	20 6.8	- 17.73	4	0.01	0.04	3
16	21 38.5	- 107.2	5	...	...	...	...	...	0
17	22 40.0	- 64.89	5	22 48.7	- 19.46	3	...	0.04	2
19	19 20.1	+ 19.49	3	...	...	...	0.01	...	2
25	20 33.5	- 274.28	5	20 13.7	- 18.02	5	0.01	0.03	4
27	19 40.3	+ 345.90	4	19 51.9	- 16.00	4	0.01	0.04	2
29	20 20.6	- 412.44	5	20 28.9	- 12.99	4	...	0.03	...
Oct. 2	21 0.7	+ 487.70	4	21 9.3	- 9.95	4	...	0.02	...
5	21 3.4	- 537.95	4	21 22.4	- 5.74	4	...	...	...
6	21 32.5	+ 547.70	4	21 45.5	- 3.44	4	...	...	...
11	21 21.8	- 555.60	2	21 41.7	+ 6.64	3	...	...	...
15	21 49.2	- 492.00	7	22 2.4	+ 12.02	3	...	0.01	4
16	21 31.5	+ 455.40	5	21 55.8	+ 13.34	3	...	0.01	...
<b>Mimas ?</b>									
Oct. 5	20 29.5	+ 27.97	...	20 48.8	- 5.70	...	...	...	...

**Titan (continued).**

Sept. 29, 21<sup>h</sup> 21<sup>m</sup>.1. Sept. 30, and Oct. 5, 21<sup>h</sup> 3<sup>m</sup>.7. The observations were made by the method of transits.

Oct. 6 and 16. The difference of R.A. determined by the method of transits.

Oct. 16. Cloudy: satellite faint.

**Japetus.**

Sept. 7. Too faint to get any more measures: seen only by glimpses.

Sept. 10. A single measure: foggy.

Sept. 14 and 15. Very faint: illuminated wires.

Sept. 16. Cloudy: no better than an estimation.

Sept. 19. Observations interrupted by a thunderstorm: bad definition.

Oct. 5. The declination measures are from the north limb only: a semidiameter of 9".65 has been applied.

All observations of difference of R.A. after Sept. 25 were made by transits.

**Mimas ?**

The observations are not from the limb, the disc of the planet being bisected by estimation.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.





1876.	Oxford Sidereal Time of Ob- servation.		Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.		Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
	h.	m.			h.	m.			in R.A.	in N.P.D.	
<b>Dione</b> (continued).											
Nov. 25	23	6.1	— 34.93	4	23	21.6	— 9.21	4	...	0.01	...
Dec. 6	22	50.3	— 40.31	4	23	6.2	— 5.24	4	...	...	...
<b>Rhea.</b>											
Aug. 11	20	4.7	+ 31.60	3	20	10.9	— 8.50	3	0.01	0.02	4
14	20	29.7	— 83.91	3	20	22.9	— 6.24	3	...	...	4
21	20	27.3	+ 84.24	3	20	47.9	+ 11.18	3	...	0.02	4
24	21	11.4	— 27.69	3	21	2.3	— 14.11	3	...	0.04	...
29	20	12.6	+ 21.52	3	20	19.9	— 8.56	3	...	0.02	3
Sept. 1	19	50.6	— 79.89	3	20	4.4	— 4.14	3	...	0.01	3
8	20	24.2	+ 84.91	3	20	17.3	+ 9.10	3	...	0.02	...
9	20	16.0	+ 13.43	3	...	...	...	...	...	...	1
11	...	...	...	...	19	33.2	— 15.26	3	...	0.04	1
15†	19	18.6	— 84.52	5	19	30.9	— 12.15	6	0.02	0.04	...
19†	22	22.3	— 80.86	6	22	10.2	— 4.19	6	...	...	...
20†	20	7.1	+ 49.28	4	20	21.4	— 17.28	4	0.01	0.04	4
23†	21	7.3	— 37.79	3	...	...	...	...	...	...	1
Oct. 6†	21	25.5	+ 26.66	2	21	10.2	+ 18.02	6	0.01	0.04	2
10†	21	57.6	+ 70.91	5	21	43.8	+ 13.04	5	...	0.02	2
11†	20	22.6	— 22.25	5	20	19.7	+ 11.08	6	...	0.02	...
13†	22	3.5	— 0.16	5	22	10.5	— 12.28	5	...	0.01	...
16	21	20.3	— 68.67	4	21	30.0	— 0.23	4	...	...	...
17	21	5.2	— 53.41	4	20	57.1	— 15.12	4	...	0.02	3
19	21	56.8	+ 73.56	4	...	...	...	...	...	...	1
21†	20	40.8	— 79.66	6	21	1.4	— 8.10	4	...	0.01	2
Nov. 1	23	42.9	+ 76.18	4	23	53.6	+ 5.53	4	...	...	4
6	22	38.1	+ 75.35	4	22	28.8	+ 12.64	4	...	0.02	3
8	23	13.5	— 79.53	4	23	0.4	— 7.90	4	...	0.01	2
17	22	47.1	— 77.76	4	22	34.9	— 6.50	4	...	...	...
29	23	9.2	+ 50.24	4	23	25.2	+ 15.30	4	...	0.02	2
Dec. 6	22	10.1	— 37.86	4	22	21.1	— 12.82	4	...	0.02	4

**Dione (continued).**

Nov. 25. The declination observations are from the north limb only, and a semi-diameter of 9".89 has been applied: often interrupted by clouds.

**Rhea.**

Sept. 1. The micrometer-reading has been diminished 1 revolution.

Sept. 9 and Oct. 21. The definition of the planet very bad.

Sept. 11, 23, Oct. 6 and 10. Cloudy.

Oct. 11. The measures of declination are from the south limb only: a semidiameter of 9".09 has been applied.

Oct. 19. Observed over illuminated wires: much mist and bad definition.

Nov. 1. Satellite faint and observation unsatisfactory: foggy.

Nov. 8. Bad definition.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

## Micrometer-Measures of Saturn's Satellites

1876.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Titan.</b>	<b>h. m.</b>	<b>"</b>		<b>h. m.</b>	<b>"</b>		<b>"</b>	<b>"</b>	
Aug. 8	20 1.5	+ 49.08	3	20 10.3	+ 27.87	4	0.03	0.06	3
14	20 5.3	- 175.83	3	20 14.9	- 27.84	3	0.03	0.06	4
21	19 54.3	+ 187.22	4	20 54.7	+ 20.69	3	0.02	0.04	...
24	20 37.6	+ 42.25	3	20 46.9	+ 29.00	3	0.02	0.05	...
25	20 11.8	- 33.69	3	20 20.2	+ 23.64	3	0.02	0.04	3
29	20 41.3	- 199.21	4	20 27.9	- 21.29	3	0.01	0.03	2
Sept. 1	19 42.2	- 85.86	3	19 57.0	- 31.18	3	0.04	0.08	...
5	19 59.3	+ 184.81	4	20 10.7	+ 11.50	3	0.01	0.03	...
8	19 58.6	+ 110.13	6	20 10.6	+ 33.44	3	0.03	0.07	4
11	19 12.7	+ 109.35	3	19 24.3	+ 15.81	3	0.02	0.04	2
15†	20 2.1	- 171.03	6	19 43.5	- 32.38	6	0.03	0.07	...
19†	21 40.9	+ 97.34	6	22 0.1	- 14.09	6	0.01	0.02	...
20†	20 58.0	+ 154.04	4	20 36.1	- 2.23	4	...	...	3
Oct. 4†	19 37.8	+ 21.35	6	19 48.5	- 27.00	6	0.03	0.05	...
6†	20 11.1	+ 148.28	6	20 46.4	- 1.67	6	...	...	...
10†	22 12.7	+ 96.57	5	22 19.8	+ 35.11	5	...	0.04	2
11†	19 59.5	+ 36.76	5	20 7.4	+ 32.31	5	0.03	0.05	2
13†	23 40.4	- 121.59	5	23 24.0	+ 10.46	5	...	0.01	2
16	22 14.5	- 191.62	6	22 23.6	+ 27.23	4	...	0.04	3
17	22 19.2	- 161.55	6	22 28.5	- 32.39	4	...	0.04	4
19	21 11.1	- 45.72	4	21 20.8	- 33.90	4	0.01	0.05	...
21	20 19.0	+ 95.77	5	20 7.6	- 15.00	5	0.01	0.03	2
31	22 4.1	- 188.74	4	22 26.6	- 15.22	4	...	0.02	0
Nov. 1	23 32.0	- 183.68	4	0 2.3	- 26.04	4	0.01	0.04	1
6	23 49.0	+ 103.01	4	23 38.3	- 14.54	4	...	0.02	...
7	21 48.2	+ 146.85	6	21 54.2	- 1.93	4	...	...	...
8	22 11.6	+ 172.95	6	22 50.7	+ 12.41	4	...	0.02	...
17	23 10.1	- 181.12	6	22 41.7	- 23.84	4	...	0.03	2
29	23 41.4	- 52.46	4	23 28.2	+ 20.78	4	0.01	0.03	...
Dec. 6	22 35.5	- 37.68	4	23 27.7	- 29.29	4	...	0.04	...

## Titan.

Whenever the difference of R.A. was more than 100" it was determined by transits, and also on Aug. 8.  
Aug. 29 and Oct. 10. Cloudy.

Sept. 11. Haze and mist.

Oct. 11. The planet's image very tremulous.  
Oct. 17, 21, and Nov. 8. Bad definition.  
Oct. 31 and Nov. 1. Observation very unsatisfactory.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet.  
The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1876-7.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Japetus.</b>									
	h. m.	"		h. m.	"		"	"	
Aug. 8	19 56.6	+ 160.06	3	20 21.0	+ 13.78	4	0.01	0.03	3
21	19 54.4	+ 553.38	4	21 2.5	- 26.65	3	0.03	0.04	2
24	21 39.6	+ 577.35	3	...	...	...	...	...	2
Sept. 8	21 22.6	+ 220.20	6	21 13.0	- 24.99	4	...	0.04	...
15†	20 22.2	+ 100.76	3	...	...	...	...	...	1
<hr/>									
Oct. 16	23 5.1	- 235.73	4	23 18.6	+ 17.89	2	...	0.03	2
17	22 40.9	- 198.00	4	23 3.1	+ 18.30	3	...	0.03	3
Nov. 6	23 3.4	+ 492.15	6	23 22.7	- 17.53	4	...	0.03	2
7	22 35.3	+ 509.40	4	22 43.6	- 18.96	4	...	0.03	2
8	22 11.3	+ 521.25	6	22 29.8	- 19.74	5	...	0.03	...
<hr/>									
17	23 9.3	+ 473.40	6	23 30.6	- 23.98	4	...	0.04	3
<hr/>									
<b>1877.</b>									
<b>Enceladus.</b>									
Aug. 31	21 25.6	+ 35.47	3	21 18.0	+ 4.22	5	...	...	3
Sept. 24	21 34.4	- 29.19	4	22 18.1	- 1.64	4	...	...	4
29	22 17.3	+ 17.21	5	22 21.7	+ 4.07	5	...	...	2
Oct. 16	22 13.3	- 36.13	5	22 23.2	- 3.27	5	...	...	...
27	23 9.3	- 31.63	5	23 15.5	- 4.60	5	...	...	4
<hr/>									
29	0 11.5	+ 33.23	5	0 17.4	+ 5.03	5	...	...	...
<hr/>									
<b>Tethys.</b>									
Aug. 7†	21 9.6	+ 38.95	5	20 52.9	+ 3.11	5	...	...	...
16†	21 1.3	- 29.03	5	20 58.1	- 11.11	5	0.01	0.02	...
31	20 35.0	- 42.54	5	20 24.0	- 5.55	5	...	...	3
Sept. 12†	21 4.2	+ 44.65	4	20 50.5	+ 4.54	4	...	...	3
15†	21 50.9	- 38.51	4	21 57.1	- 0.03	4	...	...	...

**Japetus.**

The whole of the measures of difference of R.A. are by transits, except on Sept. 15.

Aug. 21. The satellite very faint.

Aug. 24 and Sept. 15. Cloudy.

Sept. 15. The measures of R.A. are from the second limb only: a semidiameter of 10".77 has been applied.

Oct. 16. Hazy: the zero of the micrometer doubtful.

Nov. 6. Observation uncertain.

Nov. 7. The declination measures are from

the south limb only: a semidiameter of 9".27 has been applied.

**Enceladus.**

All the observations were made over illuminated wires. On Sept. 29 the satellite was extremely faint.

**Tethys.**

Aug. 16 and Nov. 22. The declination observations are from the north limb only, and a semidiameter of 9".59 and 8".84 has been applied in each case, respectively.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1877.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Tethys</b> (continued).									
	h. m.	"		h. m.	"		"	"	
Sept. 28	1 1.9	-45.63	5	1 15.6	-5.00	5	...	...	2
29	21 35.6	+40.91	5	21 29.6	+2.25	5	...	...	3
Oct. 2†	20 59.4	-45.49	4	21 55.1	-5.18	5	...	...	...
3†	23 21.7	+41.81	3	23 15.7	+5.26	5	...	...	2
5†	23 36.9	+30.83	5	23 31.0	+5.45	5	...	...	...
15†	0 8.9	-41.12	5	0 22.7	-2.60	5	...	...	...
16†	23 14.8	+42.00	5	23 26.0	+3.24	5	...	...	...
18†	22 18.9	+46.55	5	22 5.9	+3.76	5	...	...	4
22	0 32.1	+30.21	5	0 39.2	+6.43	5	...	0.01	...
23	21 19.1	-38.29	5	21 27.5	+5.88	5	...	0.01	...
29	0 28.2	+22.19	5	0 22.9	-0.96	5	...	...	3
31	1 17.3	+37.84	5	1 27.3	+2.60	5	...	...	...
Nov. 9†	21 36.3	-39.59	5	21 46.9	-5.67	5	...	...	2
10†	22 11.4	+32.04	5	22 5.6	+5.77	5	...	0.01	3
12†	21 3.1	+25.87	5	21 8.6	+5.76	5	...	...	...
19	23 16.5	+35.83	5	23 29.1	+2.34	5	...	...	...
20	23 9.9	-39.31	5	22 55.6	-2.39	5	...	...	...
22	22 45.5	-42.97	5	23 16.8	-5.26	5	...	...	...
23	22 40.7	+44.15	5	22 25.6	+4.63	5	...	...	2
29	22 56.5	+20.25	5	23 5.2	+4.90	5	...	...	...
Dec. 24	0 29.8	-34.59	4	0 42.3	-2.51	4	...	...	2
31	1 11.4	+29.54	5	0 52.6	+4.01	5	...	...	...
<b>Dione.</b>									
Aug. 7†	21 18.9	+34.26	5	...	...	...	...	...	2
16†	21 9.7	+42.27	5	21 13.7	+4.25	5	...	...	4
30	20 30.9	+45.77	5	20 23.1	+5.43	5	...	0.01	...
31	20 45.4	-51.62	5	20 53.8	-5.71	5	...	0.01	...
Sept. 12†	21 7.0	+61.21	4	20 53.4	+5.30	4	...	...	3

**Tethys** (continued).

Sept. 28 and 29. Sky foggy and image much disturbed.

Oct. 3, 23, and Nov. 23. Bad definition.

Nov. 19. Definition superb.

Dec. 24. Satellite faint from cloud.

**Dione.**

Aug. 7. Frequently interrupted by passing cloud.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet.  
 The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1877.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Dione</b> (continued).									
	h. m.	"		h. m.	"		"	"	
Sept. 29	21 20.6	+ 28.74	5	21 26.4	+ 3.96	5	...	...	4
Oct. 3†	22 59.8	— 34.79	5	23 8.5	— 4.15	5	...	...	...
5†	23 20.7	— 45.10	5	23 28.3	— 2.70	5	...	...	...
8†	23 57.1	— 60.37	4	23 46.2	— 4.60	5	...	...	...
11†	1 16.3	— 46.47	5	1 8.9	— 6.98	5	...	0.01	3
15†	0 48.1	+ 55.39	5	0 33.5	+ 6.66	5	...	0.01	...
16†	23 40.3	— 49.45	5	23 34.3	— 2.03	5	...	...	...
18†	21 59.4	+ 43.35	5	22 7.3	+ 6.31	5	...	0.01	...
22	0 56.4	— 46.12	5	...	...	...	...	...	2
23†	21 49.3	+ 51.37	5	21 33.6	+ 3.22	5	...	...	...
26†	21 49.9	+ 57.79	5	21 30.8	+ 4.01	5	...	...	3
27†	22 20.3	— 44.23	5	22 25.2	— 1.94	5	...	...	...
29	0 36.2	+ 32.52	5	0 56.7	+ 6.90	5	...	0.01	...
31	1 11.4	+ 44.55	5	1 24.4	+ 2.86	5	...	...	...
Nov. 9†	21 59.5	+ 41.48	5	21 51.9	+ 6.61	5	...	0.01	4
10†	21 55.5	— 58.04	5	22 1.3	— 4.58	5	...	...	3
13	22 3.1	— 51.26	5	22 14.9	+ 0.39	5	...	...	3
20	22 33.7	+ 35.54	5	22 48.1	+ 4.91	5	...	...	2
22	22 38.6	+ 37.98	5	23 10.0	+ 1.55	5	...	...	2
29	0 2.5	— 52.39	5	23 55.5	+ 3.03	5	...	...	3
Dec. 1†	22 45.8	+ 32.29	5	22 39.2	+ 0.30	5	...	...	4
12	22 47.6	+ 40.94	5	23 46.3	+ 5.91	5	...	0.01	2
24	0 36.4	— 50.90	4	0 47.0	— 4.83	4	...	...	3
31	1 15.7	+ 40.55	2	1 0.7	+ 5.32	...	...	0.01	1

**Dione** (continued).

Oct. 8. Very faint.

Oct. 11. Very bad definition.

Oct. 18. The definition very fine.

Oct. 22. Further observation prevented by cloud.

Oct. 26 and Dec. 31. Satellite very faint from haze and light cloud.

Oct. 29 and Dec. 12. The declination measures are from the south limb only: a semi-

diameter of 8".86 and 8".98 has been applied in each case, respectively.

Nov. 13. The observation possibly refers to Rhea. The image of the planet very diffused and tremulous.

Nov. 22. Very high wind and bad definition.

Nov. 29 and Dec. 12. Sky very hazy and the satellite faint: illuminated wires in a dark field were employed.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet.  
 The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1877.		Oxford	Diff. of	No. of	Oxford	Diff. of	No. of	Refraction		Weight.
		Sidereal Time of Ob- servation.	R.A. from Saturn's Centre.	Obs. from each Limb.	Sidereal Time of Ob- servation.	N.P.D. from Saturn's Centre.	Obs. from each Limb.	in R.A.	in N.P.D.	
Rhea.										
		h. m.			h. m.			"	"	
Aug.	2†	19 51.0	+ 68.28	5	19 42.0	— 8.45	6	0.01	0.02	3
	7†	20 31.3	— 28.48	5	20 44.7	— 3.75	5	...	...	...
	16†	20 49.7	— 27.18	5	20 54.2	— 6.37	5	...	0.01	...
	17†	20 10.3	+ 68.91	5	20 16.1	+ 5.37	5	...	0.01	2
	31	20 3.4	+ 84.16	5	20 14.2	+ 7.61	5	0.01	0.02	3
Sept.	12†	20 37.2	— 44.61	4	20 45.3	— 7.87	4	0.01	0.01	...
	21†	22 39.4	— 46.42	5	22 34.4	— 7.79	5	...	0.01	2
	24	21 20.1	— 22.80	5	21 10.8	+ 1.54	5	...	...	...
	28	1 6.6	+ 37.45	5	1 18.7	+ 1.00	5	...	...	1
	29	21 45.1	— 73.50	5	22 3.9	— 3.66	5	...	...	...
Oct.	1	22 56.8	+ 57.81	5	22 45.7	+ 2.19	5	...	...	1
	2†	21 47.3	+ 74.32	5	21 50.8	+ 10.06	5	...	0.02	...
	3†	22 50.9	— 30.10	5	23 5.0	+ 2.11	5	...	...	...
	4†	22 49.3	— 82.82	5	...	...	...	...	...	1
	8†	23 52.8	— 74.09	5	23 42.6	— 3.69	5	...	...	...
	11†	1 0.2	+ 67.36	5	0 52.5	+ 8.78	5	...	0.01	...
	15†	0 54.2	+ 80.82	5	0 40.8	+ 7.03	5	...	0.01	2
	16†	23 11.9	+ 31.42	5	23 23.7	+ 7.45	5	...	0.01	...
	18†	22 24.6	— 60.31	5	22 40.8	— 10.12	5	...	0.01	3
	22	1 4.8	— 81.14	5	0 46.6	— 7.03	5	...	0.01	...
	23†	21 12.3	— 18.29	5	21 6.6	— 6.82	5	...	0.01	3
	26†	21 5.7	— 56.43	5	21 12.6	— 0.73	5	...	...	...
	27†	22 16.6	— 63.89	5	22 23.6	— 9.31	5	...	0.01	3
	29	0 42.6	+ 73.21	5	1 0.6	+ 11.26	5	0.01	0.02	2
	31	0 51.4	— 81.39	5	0 55.5	— 7.74	5	...	0.01	...
Rhea.										
Aug. 2 and Sept. 21. The definition of Saturn very bad.					9".51, have been applied in the several cases.					
Aug. 17, Oct. 15 and 18. Cloudy.					Oct. 4. The satellite barely visible: no measures of declination could be made.					
Aug. 31. The limbs of Saturn very diffused.					Oct. 18, 27, Nov. 10 and 19. The observations were made from the north limb, and the several corrections of 9".33, 9".12, 9".46, and 8".58, have been applied.					
Sept. 28 and Oct. 1. The satellite very faint from haze and fog, and the planet very tremulous and diffused.					Oct. 23, 27, 29, and Nov. 9. Saturn very unsteady.					
Oct. 2, 29, and Nov. 12. The observations of declination are from the south limb, and semidiameters of 9".77, 8".86, and										

The sign + in the column of "difference of R.A." means that the satellite precedes the planet.  
The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.



1877.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
	h. m.	"		h. m.	"		in R.A.	in N.P.D.	
<b>Rhea</b> (continued).									
Nov. 9†	21 42.1	— 79.33	5	21 49.3	— 6.27	5	...	0.01	...
10†	21 47.3	— 27.98	5	21 40.8	— 7.71	5	...	0.01	...
12†	20 52.1	+ 55.68	5	21 11.9	+ 9.00	5	0.01	0.01	3
13	22 9.0	— 49.42	5	22 20.2	— 6.29	5	...	0.01	...
19	23 40.1	— 25.02	5	23 34.1	— 7.90	5	...	0.01	...
20	22 23.9	+ 65.22	5	22 42.2	+ 2.71	5	...	...	3
22	22 52.0	— 47.59	5	23 20.8	— 0.03	5	...	...	...
23	23 0.0	— 70.67	5	...	...	...	...	...	2
29	0 9.6	+ 64.59	5	23 50.4	+ 2.38	5	...	...	...
30†	22 13.6	+ 59.14	5	22 20.0	+ 9.67	5	...	0.01	...
Dec. 1†	23 4.1	— 41.94	5	22 30.4	+ 4.54	5	...	...	...
12	23 41.5	+ 25.92	5	23 49.6	+ 5.69	5	...	0.01	2
24	0 23.5	— 66.80	4	0 10.8	+ 3.60	4	...	...	...
27	1 43.1	+ 59.23	4	1 52.7	+ 7.58	4	0.01	0.01	3
29	1 30.2	+ 72.05	5	1 21.6	— 7.47	5	...	0.01	...
31	1 22.1	+ 72.67	5	1 48.9	+ 6.05	5	...	0.01	4
<b>Titan.</b>									
Aug. 2†	19 19.4	— 89.63	6	19 30.6	— 9.38	6	0.01	0.02	3
7†	21 28.8	+ 187.51	6	21 37.6	+ 16.46	4	0.01	0.02	3
15†	20 12.9	+ 89.33	5	...	...	...	...	...	2
16†	21 24.2	— 185.56	5	21 19.2	— 15.11	5	0.01	0.02	...
17†	20 0.7	— 146.39	6	19 57.5	— 15.52	5	...	0.04	...

**Rhea (continued).**

- Nov. 13. A possible observation of Dione.  
 Nov. 19. Excellent definition.  
 Nov. 20. Bad definition.  
 Nov. 23. Sky suddenly clouded.  
 Nov. 30 and Dec. 12. The observations of declination are from the south limb, and semidiameters of 8".79 and 8".98 have been respectively applied.  
 Dec. 12. The limbs of the planet very diffused.

Dec. 27. Great want of sharpness.

Dec. 29. The measure was made from the north limb, and a correction of 8".71 has been applied.

**Titan.**

- Aug. 2. The definition very bad. The declination measures are from the north limb only, and a semidiameter of 9".40 has been applied.  
 Aug. 7. Cloudy.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet.  
 The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1877.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction in      in R.A.   N.P.D.		Weight.
<b>Titan</b> (continued).	h. m.	"		h. m.	"		"	"	
Aug. 30	20 3.8	- 189.31	5	20 14.6	- 13.26	5	0.01	0.02	...
31	21 5.1	- 200.71	5	21 0.3	- 17.11	5	0.01	0.02	...
Sept. 12†	20 35.0	- 18.20	4	20 43.1	+ 7.39	4	...	0.01	2
15†	21 42.1	- 191.45	4	21 54.5	- 14.27	4	0.01	0.02	3
21†	22 28.3	+ 78.89	5	22 31.5	- 3.23	5	...	...	2
24	20 30.6	+ 187.32	4	21 1.4	+ 17.04	5	0.01	0.03	...
26	22 6.9	+ 115.95	5	22 17.1	+ 19.48	5	...	0.02	2
27	21 30.1	+ 51.48	5	21 56.2	+ 14.82	5	...	0.02	2
28	0 56.9	- 35.11	5	1 12.3	+ 6.90	5	...	0.01	3
29	22 12.5	- 99.82	5	22 7.9	+ 2.25	5	...	...	...
Oct. 1	22 23.1	- 192.98	5	22 35.6	- 15.25	5	...	0.02	...
2†	22 25.8	- 198.75	6	22 45.8	- 19.57	5	...	0.02	3
3†	...	...	...	23 12.1	- 19.90	5	...	0.02	1
4†	22 43.3	- 249.95	5	23 13.7	- 20.68	5	...	0.02	3
5†	23 16.6	- 64.25	5	23 25.9	- 17.65	5	...	0.02	...
8†	23 21.0	+ 142.91	5	23 39.2	+ 9.20	5	...	0.01	3
11†	0 32.9	+ 159.89	6	0 47.7	+ 18.58	5	0.01	0.02	4
15†	0 0.5	- 106.61	5	0 24.6	+ 0.40	5	...	...	2
16†	23 44.6	- 160.56	5	23 37.2	- 6.58	5	...	0.01	...
18†	22 50.5	- 195.68	5	22 43.4	- 18.75	5	...	0.02	...
22	1 11.0	+ 18.24	5	1 15.7	- 11.94	5	...	0.02	...
23	21 54.9	+ 80.70	5	21 41.2	- 4.68	5	...	...	...
26	20 54.6	+ 184.26	5	20 41.5	+ 17.01	5	0.01	0.03	4
27	23 36.9	+ 157.80	5	23 25.0	+ 19.13	5	...	0.02	...
29	0 50.9	+ 32.91	5	1 5.8	+ 16.00	5	0.01	0.02	4
Nov. 1	0 49.2	- 162.00	5	0 56.0	- 6.02	5	...	...	3
7	23 52.6	- 16.72	5	0 0.4	- 11.62	5	...	0.01	2
9†	22 3.9	+ 158.57	5	21 5.46	+ 4.01	5	...	...	...
10†	22 20.1	+ 173.88	5	22 27.8	+ 12.58	5	...	0.01	4
12†	21 20.6	+ 158.88	5	21 15.6	+ 20.83	5	0.01	0.03	3

## Titan (continued).

Sept. 12. Saturn very unsteady.  
 Sept. 15 and 21. The definition very bad.  
 Sept. 26, 27, 28, and Oct. 2. Heavy fog; the satellite faint and the definition bad.  
 Oct. 3. No measure of difference of R.A. could be made, owing to fog and bad definition.  
 Oct. 15. Very high wind and tremulous image.  
 Oct. 22. The declination measure from north

limb only: a semidiameter of 9".27 has been applied. The shadow of Titan was visible on the disc of the planet during the observation, but was not seen at its close at 1<sup>h</sup> 17<sup>m</sup> 55<sup>s</sup>, Oxford Sidereal Time.

Nov. 1. The measures of declination are from the north limb only: a semidiameter of 9".68 has been applied.

Nov. 7. Sky hazy: shadow not seen.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.



1877.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
							in R.A.	in N.P.D.	
<b>Titan</b> (continued).									
	h. m.	"		h. m.	"		"	"	
Nov. 13	22 31.2	+ 104.45	5	22 24.9	+ 19.13	5	...	0.02	3
19	0 50.1	— 186.14	5	0 54.9	— 17.87	5	0.01	0.03	1
20	23 15.6	— 163.33	5	23 3.0	— 20.75	5	...	0.02	...
22	22 29.6	— 56.00	5	22 58.4	— 17.44	5	...	0.02	1
23	22 12.2	+ 12.65	5	22 18.1	— 11.77	5	...	0.02	1
29	0 15.9	+ 97.45	5	23 44.5	+ 18.26	5	...	0.03	...
30†	22 9.0	+ 38.17	5	22 23.7	+ 15.03	5	...	0.02	...
Dec. 1†	22 59.5	— 34.69	5	22 35.8	+ 8.78	5	...	...	4
12	23 59.3	+ 145.47	5	23 51.7	+ 11.84	5	...	0.02	...
18†	23 45.9	— 96.67	5	23 58.5	— 0.47	5	...	...	1
24	0 17.3	— 50.88	4	0 4.8	+ 13.15	4	...	0.02	2
27	1 13.7	+ 131.41	4	1 44.6	— 5.30	4	...	...	1
29	0 57.8	+ 162.90	6	1 15.4	+ 15.71	5	0.01	0.02	2
31	1 30.6	+ 91.54	5	1 43.7	+ 15.30	5	0.01	0.02	2
<b>Japetus.</b>									
Sept. 12†	21 12.7	+ 206.91	4	20 56.2	— 33.90	4	0.02	0.05	3
15†	21 42.1	+ 321.24	4	21 59.3	— 32.10	4	0.01	0.04	2
24	20 30.6	+ 546.96	4	20 51.7	— 41.03	4	0.03	0.07	2
28	1 31.5	+ 564.44	6	1 23.5	— 56.22	5	0.01	0.07	4
29	22 37.4	+ 560.38	6	22 27.8	— 61.90	5	0.01	0.07	...
Oct. 2†	22 25.8	+ 524.50	6	22 39.6	— 66.12	5	0.01	0.08	2
5†	23 49.9	+ 457.49	5	23 58.6	— 72.91	5	0.01	0.09	3
8†	23 20.9	+ 363.65	5	23 35.2	— 68.11	5	0.01	0.08	3
16†	23 19.1	+ 28.61	5	23 30.5	— 48.21	5	...	0.05	...
23†	22 7.6	— 277.95	5	22 21.6	— 6.95	5	...	0.01	...

**Titan (continued).**

Nov. 23. Sky generally cloudy. In a partial break at 23<sup>h</sup> 30<sup>m</sup> the shadow of Titan was last seen, and at that time not quite central.

Nov. 30. Very bad definition.

Dec. 1 and 12. The observations of declination were made from the south limb only: a semidiameter of 9".64 and 8".98 was applied in each case, respectively.

Dec. 18. No definition.

**Japetus.**

Sept. 15 and Oct. 2. Definition very bad and limbs boiling.

Sept. 15, Oct. 23 and 27. The observations of declination were made from the more distant limb of the planet, and corrections of 10".02, 10".07, and 9".32 have been applied in the several cases.

Oct. 2, 5, and 16. Japetus very faint.

Oct. 8. Saturn's image tremulous.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet. The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

1877.	Oxford Sidereal Time of Ob- servation.	Diff. of R.A. from Saturn's Centre.	No. of Obs. from each Limb.	Oxford Sidereal Time of Ob- servation.	Diff. of N.P.D. from Saturn's Centre.	No. of Obs. from each Limb.	Refraction Correction		Weight.
	h. m.	"		h. m.	"		in R.A.	in N.P.D.	
<b>Japetus</b> (continued).									
Oct. 27	23 37.5	-419.10	5	23 31.3	+10.86	4	...	0.01	2
29	1 39.5	-464.39	5	1 52.8	+22.30	3	0.01	0.03	1
Nov. 9†	22 16.1	-516.31	5	22 18.3	+61.07	3	0.01	0.08	...
29	23 28.2	+158.21	5	23 36.1	+25.54	5	...	0.03	4
30†	22 39.0	+192.72	5	22 32.7	+23.72	5	...	0.03	...
Dec. 1†	22 52.1	+231.64	5	22 22.8	+20.06	5	...	0.02	...
29	0 50.8	+239.07	6	1 5.8	-60.62	4	0.03	0.08	3
31	0 25.8	+155.74	6	0 44.0	-57.18	4	0.02	0.08	0

## Japetus (continued).

Oct. 29. The sky generally cloudy: the observation uncertain.

Dec. 1. The satellite very faint.

The sign + in the column of "difference of R.A." means that the satellite precedes the planet.  
 The sign + in the column of "difference of N.P.D." means that the satellite is north of the planet.

II.

OBSERVATIONS

OF

DOUBLE STARS

IN THE YEARS

1876 AND 1877.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.			h. m.	1800 +
1	38 Piscium ....	65	0 11 13	81 47.6	6.0, 6.5	3 0 W	77.04
2	Σ 23 .....	66	0 11 20	90 21.1	7.5, 11.0	1 0 W	76.92
3	" .....	"	"	"	8.0, 10.5	0 10 W	76.93
4	" .....	"	"	"	8.0, 10.5	2 0 W	77.99
5	" .....	"	"	"	7.5, 10.5	1 55 W	78.00
6	OΣ 9 .....	123	0 19 42	33 52.3	7.0, 11.0	5 50 E	76.65
7	" .....	"	"	"	7.0, 11.0	3 30 W	77.07
8	η Cassiopeie .....	283	0 41 43	32 48.8	4.0, 7.0	1 15 E	76.47
9	" .....	"	"	"	4.0, 7.0	0 40 E	76.47
10	" .....	"	"	"	4.0, 8.0	5 40 E	76.65
11	" .....	"	"	"	4.0, 6.0	3 10 W	76.95
12	" .....	"	"	"	4.0, 6.5	2 5 W	77.05
13	" .....	"	"	"	4.0, 7.0	6 30 W	77.15
14	36 Andromedæ ...	319	0 48 32	67 1.2	5.0, 7.0	3 0 E	76.69
15	" .....	"	"	"	5.0, 5.6	1 50 E	76.94
16	" .....	"	"	"	5.0, 6.5	3 0 W	77.12
17	" .....	"	"	"	5.0, 5.6	1 42 W	77.99
18	Σ 80 .....	344	0 53 15	89 51.8	7.0, 9.0	1 30 W	77.07
19	Σ 86 .....	373	0 58 43	96 6.7	8.0, 8.0	0 5 W	76.93
20	" .....	"	"	"	8.0, 8.5	0 40 W	76.93
21	" .....	"	"	"	7.0, 8.5	0 38 W	76.95
22	Σ 90 .....	382	0 59 36	85 43.7	6.5, 7.5	0 45 W	76.94
23	" .....	"	"	"	7.0, 7.5	0 20 E	77.02
24	" .....	"	"	"	7.0, 7.5	1 50 E	77.05
25	42 Ceti .....	474	1 13 40	91 8.3	7.0, 8.0	1 10 E	76.92
26	" .....	"	"	"	6.0, 8.5	1 5 W	76.93
27	" .....	"	"	"	7.0, 8.5	2 13 W	78.00
28	Σ 135 .....	549	1 27 17	54 25.5	8.0, 10.5	3 30 W	77.10
29	Σ 138 .....	568	1 29 47	82 58.1	8.0, 8.5	1 5 W	76.93
30	" .....	"	"	"	8.0, 8.5	0 10 E	77.02
31	" .....	"	"	"	7.0, 7.0	2 20 W	78.00
32	OΣ 35 .....	606	1 35 58	34 43.7	6.0, 11.0	0 25 W	76.47
33	Σ 155 .....	628	1 37 54	81 7.0	8.0, 8.0	2 0 W	77.01
34	" .....	"	"	"	7.5, 7.5	2 20 W	77.01
35	" .....	"	"	"	8.0, 8.0	0 20 W	77.02
36	" .....	"	"	"	8.0, 8.0	0 3 W	77.06
37	" .....	"	"	"	8.0, 8.2	0 40 W	77.95
38	Σ 158 .....	637	1 39 50	57 26.2	8.0, 8.9	3 0 W	77.10

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
°			"			
238.50	6	3	4.74	6	3	
350.59	6	4	8.14	6	4	Stars very tremulous.
352.09	6	4	8.31	6	4	Sky somewhat hazy.
351.57	6	2	8.26	8	2	Cloudy.
352.05	6	4	8.12	8	4	A White. B Blue.
57.02	4	4				Observation very difficult.
56.72	6	5	1.48	6	2	A White. Cloudy.
148.76	5	3	5.77	6	3	
147.30	6	3	5.47	6	3	A Yellow. B Blue.
148.27	6	2	5.51	6	2	A Yellow. B Blue. Cloudy.
150.16	6	4	5.57	8	4	A Yellow. B Purple.
150.87	6	2	5.32	6	2	Foggy.
148.98	6	4	5.20	6	4	A Yellow. B Purple. Cloudy.
357.02	4	3	1.57	2	3	
360.80	6	1	1.62	4	1	Never separated. Both stars yellow.
360.03	6	3	1.41	6	3	Yellow.
356.84	6	3	1.39	4	1	Stars not separated. Light yellow.
311.28	6	1	20.00	8	2	A White. B Grey. Cloudy.
160.00	8	3	12.64	6	3	Observer J.
159.22	6	4	12.65	6	4	Slightly green.
161.80	5	2	12.67	6	2	Stars diffused.
83.17	3	4	32.76	6	4	A White. B Lilac.
82.03	6	4	32.97	6	4	Stars diffused.
82.87	6	1	33.08	6	1	Stars flashing and unsteady.
348.98	5	2	1.1			Sky cloudy. Distance estimated.
349.60	6	4	1.29	6	3	At times not separated. Straw-coloured.
349.18	6	3	1.47	8	3	A White. B Lilac.
259.10	6	4	7.51	6	3	A White. B Ash. Sky rather hazy.
31.32	6	2	1.38	6	4	Slightly blue.
28.59	6	2	1.56	6	2	
30.53	6	2	1.52	8	2	
98.30	2	1				Comes seen with great difficulty.
328.85	6	3	4.56	6	3	Much cloud. Slightly blue.
328.77	6	3	4.73	6	4	Sky hazy. Reddish tint: nearly white.
330.53	6	1				Very bad definition.
331.03	6	4	4.96	6	3	Stars blue.
329.30	6	4	4.71	6	4	Stars blue.
255.47	6	2	2.31	6	2	Straw-coloured.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	'		h. m.	1800 +
39	$\alpha$ Piscium .....	753	1 55 50	87 49.0	4.0, 6.0	0 3 W	76.93
40	" .....	"	"	"	4.0, 4.5	0 0	76.93
41	" .....	"	"	"	4.0, 4.5	2 0 W	77.01
42	" .....	"	"	"	3.0, 4.5	0 30 E	77.06
43	" .....	"	"	"	3.5, 5.0	1 0 W	77.99
44	$\epsilon$ Cassiopeie, A B	906	2 19 10	23 8.2	5.0, 9.0	4 20 W	76.28
45	" .....	"	"	"	4.5, 7.0	6 30 W	77.16
46	" A C	"	"	"	5.0, 9.0	4 5 W	76.28
47	$\Sigma$ 263 .....	913	2 20 29	29 53.0	7.0, 10.5	2 40 W	77.07
48	$\Sigma$ 264 .....	914	2 20 36	29 52.8	9.0, 10.5	3 0 W	77.07
49	$\Sigma$ 269 .....	925	2 21 9	60 39.8	8.0, 9.5	0 10 W	76.93
50	" .....	"	"	"	7.0, 10.0	0 5 W	76.95
51	$\gamma$ Ceti .....	1019	2 37 5	87 16.3	3.0, 8.5	0 0	76.93
52	" .....	"	"	"	3.0, 8.0	1 37 E	77.02
53	" .....	"	"	"	3.0, 8.0	0 30 W	77.99
54	$\Sigma$ 300 .....	1020	2 37 30	61 3.0	8.0, 8.2	1 10 W	77.01
55	" .....	"	"	"	8.0, 8.2	0 30 W	77.01
56	" .....	"	"	"	7.0, 7.1	2 5 W	77.04
57	$\Sigma$ 305 .....	1036	2 40 41	71 8.5	7.0, 8.0	2 30 W	76.99
58	" .....	"	"	"	7.0, 7.8	0 40 W	77.01
59	" .....	"	"	"	7.0, 7.5	0 48 W	77.99
60	$\epsilon$ Arietis .....	1098	2 52 21	69 8.4	4.0, 4.5	0 10 W	77.01
61	$\Sigma$ 403 .....	1271	3 24 17	70 37.5	8.5, 8.5	1 48 W	77.13
62	$\Sigma$ 422 .....	1308	3 30 38	89 48.1	6.5, 9.0	0 50 E	76.93
63	" .....	"	"	"	7.0, 8.8	1 30 W	77.01
64	" .....	"	"	"	6.0, 7.5	0 40 E	77.07
65	$\beta$ 2 Eridani .....	1436	3 48 16	93 18.6	5.5, 8.5	0 45 E	76.07
66	" .....	"	"	"	6.0, 8.5	0 30 W	76.07
67	" .....	"	"	"	5.0, 6.3	0 0	76.93
68	" .....	"	"	"	6.0, 7.0	0 14 E	76.99
69	" .....	"	"	"	...	0 0	77.04
70	$\epsilon$ Persei .....	1438	3 49 48	50 19.8	4.0, 8.0	1 30 E	77.04
71	$\Omega$ 72 .....	1500	4 1 7	72 58.6	...	0 10 W	76.07
72	" .....	"	"	"	6.0, 10.0	1 30 E	77.07
73	$\beta$ 3 Eridani .....	1551	4 9 49	97 48.7	...	0 30 E	77.05
74	$\Sigma$ 535 .....	1600	4 16 39	78 54.1	7.5, 9.0	0 20 W	77.01
75	$\Sigma$ 577 .....	1715	4 34 9	52 43.0	9.2, 9.1	0 10 E	77.08

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- clud- d Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
			"			
326.00	4	1	3.22	6	2	A White. B Bluish. Cloudy.
326.50	6	2	3.11	4	1	Sky very hazy.
326.17	6	4	3.03	6	4	A Straw-colour. B Light blue.
326.18	6	4	2.84	6	4	Foggy.
324.17	6	2	3.01	6	2	A White. B Pale green.
265.13	4	2	2.01	3	1	A White. B Green. Definition bad.
265.92	6	4	2.07	6	4	A White.
106.48	4	2	7.83	3	1	A White. B Blue. Definition bad.
84.13	6	2	15.27	6	3	A Slightly grey. Definition indifferent.
205.32	6	2	16.52	6	3	
339.82	4	0	2.19	6	0	A Ruddy. B Blue.
342.18	6	2	1.61	6	2	Definition bad.
290.48	6	4	2.82	6	4	Slightly green.
291.40	6	2	2.84	6	2	B Green. Sky cloudy.
291.68	6	3	2.54	6	3	Clouds.
298.78	6	4	2.87	6	4	Cloudy. Slight blue tint.
300.00	6	5	2.66	6	5	Blue.
300.83	6	5	2.85	6	5	Ashen grey.
320.27	6	4	2.98	6	4	Cloudy.
321.75	6	4	2.54	6	4	Slightly red.
320.83	6	2	2.80	6	2	Ruddy.
198.00	6	4	1.19	6	4	White. Only elongated.
179.10	6	4	2.98	6	4	White.
242.95	6	2	5.91	6	2	A Yellow. B Blue.
243.28	6	4	6.01	6	4	A Golden. B Violet.
242.58	6	4	5.82	6	4	A Reddish. B Bluish grey.
347.63	6	2				A White. B Blue.
346.55	2	2	6.66	2	2	Observer J.
346.38	6	3	6.59	8	3	A Yellow. B Bluish.
348.35	6	4	7.01	6	4	A Light gold. B Lilac.
347.65	6	4	6.86	6	4	
6.39	6	4	8.73	6	4	A Purple. B White. Cloudy.
331.84	6	2				Difficult object.
328.77	6	5	4.97	6	5	A Ruddy. B Slightly blue.
105.38	6	1				Definition too bad for observation of distance.
341.68	6	5	1.77	6	5	Bluish.
349.77	7	4	1.23	6	4	White. Elongated.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.			h. m.	1800 +
76	$\Sigma$ 583 .....	1726	4 34 45	89 15 7	8.0, 9.0	1 0 E	77.05
77	5 Aurigæ ....	1844	4 52 3	50 46.9	5.0, 10.0	0 20 E	77.08
78	14 Orionis .....	1923	5 1 21	81 40.6	5.0, 6.5	0 10 E	77.04
79	" .....	"	"	"	5.0, 6.5	2 0 W	77.24
80	14 Aurigæ, A B . . .	1961	5 7 36	57 27.1	5.0, 7.5	1 20 E	76.29
81	" .....	"	"	"	5.0, 9.0	2 30 E	77.02
82	" .....	"	"	"	4.5, 7.0	3 0 E	77.06
83	" A C .....	"	"	"	5.0, 11.0	1 10 E	76.29
84	$\Sigma$ 694 .....	2050	5 16 39	65 9 1	9.0, 9.0	1 0 E	77.07
85	" .....	"	"	"	9.0, 9.0	1 0 E	77.08
86	$\Sigma$ 697 .....	2051	5 16 39	74 2.6	7.0, 8.0	2 30 W	77.06
87	" .....	"	"	"	8.0, 8.5	0 2 W	77.07
88	$\Sigma$ 712 .....	2091	5 20 14	87 10.1	7.0, 9.5	0 30 E	77.07
89	" .....	"	"	"	7.0, 8.5	0 10 W	77.09
90	$\Sigma$ 719 ? .....	...	5 22 28	60 33.0	7.0, 9.0	0 30 E	77.07
91	$\Sigma$ 742 .....	2165	5 29 14	68 4.8	7.0, 7.5	0 0	77.07
92	" .....	"	"	"	7.0, 7.5	0 20 E	77.07
93	" .....	"	"	"	6.0, 7.5	1 30 E	77.08
94	" .....	"	"	"	6.0, 6.5	1 40 W	77.22
95	$\Sigma$ 835 .....	2413	5 57 15	71 42.6	9.0, 11.0	0 12 E	77.07
96	" .....	"	"	"	8.5, 11.0	1 0 E	77.09
97	$\Sigma$ 853 .....	2462	6 2 28	78 19.0	8.0, 8.5	1 0 E	77.07
98	A.C. 3 .....	2498	6 5 48	94 38.2	7.0, 9.0	0 40 W	77.09
99	$\Sigma$ 877 .....	2515	6 7 52	75 22.4	6.0, 6.5	1 0 E	77.09
100	" .....	"	"	"	7.7, 7.9	3 0 W	77.21
101	$\Sigma$ 919, A B .....	2650	6 23 0	96 57.3	5.6, 6.0	0 0	77.09
102	" A C .....	"	"	"	6.0, 6.7	0 15 E	77.09
103	11 Monocerotis . . .	2650	6 23 0	96 57.3	5.6, 6.0	0 0	77.09
104	$\Sigma$ 932 .....	2695	6 27 31	75 9.4	7.0, 8.0	2 0 E	77.09
105	" .....	"	"	"	7.0, 8.3	2 0 W	77.21
106	15 Monocerotis, A B	2755	6 34 22	79 59.6	5.0, 11.0	1 20 E	76.27
107	" .....	"	"	"	7.0, 10.0	1 30 E	77.05
108	" A C .....	"	"	"	5.0, 11.0	1 10 E	76.27
109	" .....	"	"	"	7.0, 12.0	1 10 E	77.05
110	38 Geminorum .....	2872	6 47 52	76 40 1	4.5, 8.5	0 35 E	76.09
111	" .....	"	"	"	6.0, 9.0	0 10 W	76.18
112	" .....	"	"	"	4.0, 7.5	1 40 E	77.05
113	" .....	"	"	"	4.0, 8.0	1 20 E	77.07



Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
327.99	7	2	5.91	6	2	Definition very bad.
243.77	6	5	2.49	6	5	
209.15	9	2	1.27	6	2	An ashen grey mass. Not separated.
208.12	6	4	1.14	6	4	Not separated.
224.58	4	1				A Yellowish white. B Blue. Definition bad.
225.00	6	2	14.64	6	2	B Blue. Observed in dark field. Very cloudy.
225.53	4	2	14.90	7	3	Interrupted by cloud. A Straw-colour. B Purple.
344.45	2	1				Definition too bad for observation of distance.
1.20	6	4	1.23	6	4	Blue. Difficult.
0.20	6	4	1.25	6	4	White. Difficult: only elongated.
285.68	6	4	25.90	6	4	A White. B Light blue.
284.15	6	5	26.00	6	5	A White. B Pale green.
56.92	6	2	2.96	6	2	A White. B Blue.
55.84	6	3	3.31	6	3	A Greenish white. B Blue.
304.32	6	4	14.10	6	4	A White. B Blue.
254.55	6	4	3.23	6	4	A Light mauve. B Grey.
253.50	6	1	3.01	6	2	White.
253.75	6	5	3.17	6	5	A Light yellow. B Pale blue.
255.65	6	3	3.15	6	2	A Greyish white.
147.97	6	4				Slightly blue.
146.15	6	4	2.19	6	4	Pale blue. Difficult.
350.35	6	2	27.08	6	2	Slight mist.
173.83	6	4	1.14	6	2	Elongated.
262.97	6	5	5.27	6	5	Ashen grey.
264.74	6	5				Blue.
124.27	6	1	9.97	6	5	Reddish white. Zero of Position-Circle uncertain.
100.75	6	1	2.82	6	5	Zero of Position-Circle uncertain.
129.63	6	1	7.15	6	5	Zero of Position-Circle uncertain.
331.52	6	4	1.97	6	4	White.
330.13	6	4	2.17	6	4	Greenish white.
211.62	4	1				Dark field: seen with difficulty.
210.90	4	2	3.43	6	0	Distance little better than estimation.
11.15	4	1				Dark field: seen with difficulty.
12.43	6	2				Definition very indifferent.
162.80	2	3	6.31	2	3	Observer J.
161.65	4	1				Definition very bad.
162.30	7	5	6.40	6	5	Observer J.
163.57	6	3	6.38	6	3	A Very white. B Purple.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.			h. m.	1800 +
114	$\Sigma$ 1037 .....	3012	7 5 21	62 34.2	7.5, 7.5	1 30 E	77.08
115	"	"	"	"	7.5, 7.5	1 40 E	77.09
116	"	"	"	"	7.0, 7.5	1 10 W	77.21
117	$\Sigma$ 1083 .....	3136	7 18 31	69 16.8	8.0, 9.0	0 40 W	76.18
118	"	"	"	"	8.0, 8.5	0 15 E	76.29
119	Castor .....	3228	7 26 57	57 50.9	2.5, 3.2	4 0 W	76.36
120	"	"	"	"	2.0, 3.2	4 30 W	76.36
121	"	"	"	"	2.0, 2.5	5 0 W	76.38
122	"	"	"	"	2.0, 4.0	3 20 E	76.94
123	"	"	"	"	2.0, 4.0	3 20 E	76.94
124	"	"	"	"	2.0, 3.2	1 40 E	77.09
125	"	"	"	"	2.0, 3.2	1 46 E	77.13
126	$\Sigma$ 1177 .....	3499	7 58 15	63 7.7	7.0, 7.5	3 30 E	77.05
127	$\zeta$ Cancri, A B .....	3557	8 5 20	71 59.4	5.0, 5.6	1 20 W	77.20
128	"	"	"	"	6.0, 6.5	1 0 E	77.20
129	"	"	"	"	6.0, 6.5	1 0 W	77.27
130	" A C .....	"	"	"	5.0, 6.7	1 0 W	77.20
131	"	"	"	"	5.0, 6.7	1 10 W	77.20
132	$\nu$ Cancri .....	3681	8 19 32	65 4.2	7.0, 7.5	0 55 W	76.36
133	"	"	"	"	...	1 10 W	76.36
134	"	"	"	"	7.0, 8.5	1 30 E	77.13
135	$\phi^2$ Cancri .....	3680	8 19 33	62 40.4	6.5, 7.0	0 10 W	76.26
136	"	"	"	"	7.0, 7.0	4 0 E	77.05
137	"	"	"	"	7.0, 8.5	1 40 E	77.13
138	$\Sigma$ 1263 .....	3832	8 37 17	47 51.8	9.0, 10.0	1 30 W	76.36
139	"	"	"	"	...	1 40 W	76.36
140	$\epsilon$ Hydre .....	3863	8 40 25	83 8.5	4.0, 10.0	1 46 W	76.26
141	"	"	"	"	4.0, 7.0	0 0	77.20
142	$\sigma^2$ Ursæ Majoris ...	3989	8 59 51	22 22.6	6.0, 9.0	9 0 W	76.59
143	$\Sigma$ 1321 .....	4046	9 6 17	36 47.2	7.0, 8.0	3 10 W	76.46
144	$\Sigma$ 1355 .....	4160	9 20 59	83 14.7	8.0, 8.0	0 35 W	76.26
145	"	"	"	"	6.0, 6.7	1 0 E	77.20
146	$\omega$ Leonis .....	4165	9 22 2	80 25.2	7.0, 7.5	1 30 E	77.20
147	"	"	"	"	6.0, 6.5	0 0	77.20
148	"	"	"	"	7.0, 7.5	0 50 W	77.20
149	"	"	"	"	7.0, 7.5	0 45 W	77.21
150	"	"	"	"	7.0, 7.0	1 30 E	77.24
151	$\gamma$ Leonis .....	4469	10 13 21	69 33.1	...	...	76.35
152	"	"	"	"	3.0, 5.0	2 5 W	76.48

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
°			"			
311.12	6	4	1.30	6	4	White.
314.23	6	5	1.43	6	5	White.
311.28	6	5	1.35	6	5	Light yellow.
46.85	4	2				Very high wind shaking the instrument.
46.40	3	2	7.83	4	1	
233.08	6	4	5.57	6	4	White.
235.12	5	3	5.56	6	3	Quite white.
235.25	3	3	5.78	4	3	White.
232.65	6	3				Very white.
232.59	6	3				
235.68	6	5	5.53	6	5	Greenish white. Images flaring.
234.23	6	4	5.46	6	2	Both stars very white.
350.63	7	4	3.38	6	4	A Light green. B Yellowish white.
111.95	6	4	0.7			Yellow. Unsatisfactory observation.
108.71	7	4	0.64	2	4	Yellow. Well seen : suspicion of fiddling in wire.
110.34	6	5	0.94	4	5	Light yellow.
130.05	6	2	4.85	6	2	Circumstances favourable.
131.20	6	3	5.01	6	3	Observer J.
39.83	4	2	6.64	4	1	Observed by a student.
40.67	3	3	6.23	4	3	Images very tremulous.
41.37	6	4	6.05	8	4	A Reddish white. B Greenish tint. Inter- rupted by cloud.
216.33	6	2	5.00	4	2	No noticeable colour.
213.28	6	4	4.55	6	4	Definition fair.
214.72	6	4	4.67	6	4	Light blue.
18.31	3	3	38.57	3	3	Observed over illuminated wires.
20.73	3	1				Observed by a student.
216.00	4	2	3.62	3	2	A Yellow. B Blue. Star B not easily seen.
218.02	6	1	3.76	6	1	A Greenish yellow. Stars not separated.
243.88	5	1	2.7			Definition bad ; unsatisfactory.
59.55	4	5	19.90	4	5	Definition excellent. Yellow.
330.88	4	2	2.56	3	2	White. Very unsteady.
330.97	6	4	2.62	6	4	White.
66.2	2	1	0.5			Observation not satisfactory.
66.5	3	1				
71.9	4	1				
75.9	5	3	0.54	5	3	A fairly satisfactory observation.
69.4	4	3	0.6			Obs. thought tolerably certain. Dist. estimated.
111.61	2	5				Observation of distance prevented by clouds.
112.20	5	3	3.51	6	3	Deep yellow.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	° ' "		h. m.	1800 +
153	35 Sextantis .....	4638	10 37 7	84 37.6	6.0, 7.0	1 10 W	76.36
154	"	"	"	"	6.0, 7.0	1 30 W	76.36
155	54 Leonis .....	4719	10 49 7	64 36.6	5.0, 8.0	1 0 W	76.34
156	ξ Ursæ Majoris .....	4860	11 11 48	57 47.4	5.0, 5.5	1 40 E	76.31
157	"	"	"	"	5.0, 6.0	1 10 E	76.31
158	"	"	"	"	5.0, 5.0	3 20 W	76.47
159	"	"	"	"	5.0, 6.0	4 0 W	76.56
160	"	"	"	"	4.5, 6.5	6 20 W	76.59
161	"	"	"	"	4.0, 5.0	5 0 E	77.07
162	"	"	"	"	"	4 40 E	77.07
163	"	"	"	"	5.0, 6.0	5 30 E	77.08
164	"	"	"	"	5.0, 5.5	3 0 E	77.15
165	"	"	"	"	4.0, 5.5	3 0 E	77.24
166	"	"	"	"	4.0, 7.0	2 30 E	77.27
167	"	"	"	"	4.0, 5.5	3 20 W	77.43
168	Σ 1527 .....	4865	11 12 42	75 4.3	8.0, 8.5	0 55 W	76.26
169	"	"	"	"	7.5, 9.0	1 15 W	76.31
170	"	"	"	"	7.0, 8.5	2 40 E	77.15
171	ε Leonis .....	4896	11 17 39	78 48.5	4.5, 9.0	0 55 E	76.36
172	"	"	"	"	4.0, 7.5	3 0 W	77.45
173	"	"	"	"	4.5, 8.0	4 30 W	77.48
174	57 Ursæ Majoris ...	4924	11 22 37	50 0.2	5.5, 9.0	2 27 W	76.41
175	"	"	"	"	5.0, 8.5	5 30 W	76.56
176	"	"	"	"	5.5, 8.5	5 0 W	77.48
177	Σ 1553 .....	4976	11 30 3	33 11.4	7.0, 7.5	4 10 W	76.40
178	"	"	"	"	8.5, 8.8	5 30 W	77.48
179	γ Virginis .....	5377	12 35 36	90 47.5	3.4, 3.4	0 35 E	76.31
180	"	"	"	"	3.4, 3.4	2 45 W	76.48
181	"	"	"	"	2.3, 2.3	1 30 W	77.45
182	"	"	"	"	3.0, 3.4	2 30 W	77.48
183	"	"	"	"	2.5, 3.0	2 0 W	77.52
184	ΩΣ 253 .....	5301	12 38 3	68 9.6	7.0, 10.0	1 10 W	76.35
185	Σ 1678 .....	5401	12 39 25	74 58.2	7.5, 7.7	0 49 W	76.31
186	"	"	"	"	7.5, 7.5	2 29 W	76.48
187	"	"	"	"	7.8, 8.1	3 10 W	77.48
188	"	"	"	"	6.0, 6.5	3 0 W	77.52
189	35 Comæ .....	5430	12 47 23	68 6.1	6.0, 8.0	6 0 W	76.56
190	"	"	"	"	5.0, 7.5	2 30 W	77.44

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
0			"			
240.50	4	3	7.54	4	3	Observer J.
238.63	3	3	7.20	3	3	A Light yellow. B Light blue.
103.33	4	1	6.12	3	1	A White. B Slightly green. Definition very bad.
304.40	4	2	1.5			Separated with great difficulty. Dist. estimated
303.25	2	3	1.49	3	3	Stars yellow. Observer J.
302.40	5	4	1.57	6	5	Yellow.
299.32	6	5	1.51	8	5	Definition very good. Discs very hard.
299.20	8	4	1.47	4	2	Stars deep yellow.
298.87	6	4	1.55	6	3	Stars not separated: very tremulous.
297.83	3	2				
296.90	7	4	1.72	6	2	Not separated.
295.00	6	2	1.35	6	2	A Greenish yellow. B Bluish white.
297.48	5	4	1.59	6	4	Very well seen.
297.43	6	5	1.46	6	5	Chrome yellow.
295.04	6	4	1.76	6	4	Yellow.
12.30	4	2	3.53	3	2	A White. B Bluish white.
12.69	4	1	3.69	4	1	Stars slightly blue.
10.60	6	4	3.40	6	4	A Reddish white. B Blue.
68.00	5	2	2.84	4	2	A Yellowish white. B Blue.
68.62	6	1	2.92	6	1	A White. B Blue.
67.15	6	3	2.86	6	3	A Yellow. B Light blue.
7.05	6	4	5.56	6	4	White.
6.92	6	4	5.54	4	4	A White. B Purple.
6.00	6	4	5.30	6	4	A Pale blue. B Dark blue.
168.08	5	3	5.80	8	4	White stars.
169.90	6	4	5.48	6	3	Greyish white.
160.06	4	0				Both stars white.
159.55	5	3	5.07	3	3	Both stars white. Stars blazing.
160.62	6	4	4.37	6	4	White.
160.26	7	3	4.89	6	3	Stars flaring.
339.53	6	3	4.38	6	3	Stars white.
233.98	4	2	6.85	4	1	A Yellow. B Grey.
201.48	4	1				A Yellowish white. B Bluish white.
201.23	4	3	32.29	6	3	
200.78	4	2	32.07	6	4	Ashen grey.
200.97	6	4	32.47	6	4	Grey.
60.86	5	3	1.35	4	2	Very unsteady.
62.44	5	1	1.32	2	1	Not separated: night bad. Stars greyish.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	° ' "		h. m.	1800 +
191	0 $\Sigma$ 261 ..	5535	13 6 21	57 17.1	7.0, 7.5	4 0 W	76.63
192	"	"	"	"	7.5, 7.7	3 30 W	77.48
193	"	"	"	"	7.0, 7.0	2 50 W	77.49
194	$\Sigma$ 1757 .....	5639	13 28 11	89 41.6	8.0, 9.0	0 20 E	76.35
195	"	"	"	"	8.0, 9.0	1 45 W	76.48
196	$\epsilon$ Virginis .....	5704	13 37 3	85 51.2	5.6, 8.3	2 5 W	77.51
197	"	"	"	"	5.0, 7.5	3 0 W	77.51
198	"	"	"	"	...	3 30 W	77.51
199	$\Sigma$ 1785 .....	5754	13 43 38	62 25.1	7.0, 8.0	0 55 W	76.35
200	"	"	"	"	8.0, 8.0	0 32 W	76.48
201	$\Sigma$ 1812 .....	5894	14 7 6	60 43.2	7.5, 9.2	2 20 W	77.51
202	"	"	"	"	7.0, 9.3	3 0 W	77.51
203	$\Sigma$ 1813 .....	5895	14 7 24	84 2.2	8.0, 8.5	0 20 E	76.34
204	"	"	"	"	8.0, 8.5	1 40 W	77.48
205	"	"	"	"	...	2 30 W	77.50
206	"	"	"	"	8.0, 8.5	2 5 W	77.50
207	"	"	"	"	8.0, 8.2	2 30 W	77.52
208	$\Sigma$ 1819 .....	5907	14 9 18	86 18.7	6.0, 6.5	3 30 W	76.67
209	"	"	"	"	8.0, 8.0	1 10 W	77.44
210	"	"	"	"	7.0, 7.5	2 0 W	77.48
211	"	"	"	"	8.0, 8.0	3 0 W	77.50
212	$\Sigma$ 1825 .....	5922	14 10 59	69 19.0	6.0, 8.5	2 40 W	77.51
213	"	"	"	"	6.5, 8.3	3 0 W	77.51
214	$\Sigma$ 1842 .....	5987	14 20 57	85 46.2	9.0, 9.0	3 0 W	77.51
215	"	"	"	"	9.0, 9.2	3 10 W	77.51
216	$\Sigma$ 1858 .....	6040	14 28 41	53 53.2	7.5, 9.2	3 0 W	77.51
217	"	"	"	"	7.0, 7.5	3 0 W	77.51
218	$\pi$ Bootis.....	6066	14 35 5	73 4.1	...	0 40 E	76.43
219	"	"	"	"	5.0, 6.0	0 20 W	76.47
220	"	"	"	"	5.0, 6.5	0 10 E	77.43
221	"	"	"	"	5.0, 5.5	1 20 W	77.50
222	$\epsilon$ Bootis .....	6101	14 39 45	62 25.2	3.0, 8.0	0 40 E	76.35
223	"	"	"	"	3.0, 8.0	2 5 E	76.50
224	"	"	"	"	3.0, 8.0	1 40 E	76.50
225	"	"	"	"	3.0, 8.0	0 30 W	76.51
226	"	"	"	"	3.0, 7.0	0 30 E	76.91
227	"	"	"	"	3.0, 6.5	1 0 E	77.44
228	$\gamma$ Bootis .....	6150	14 45 32	40 47.3	5.0, 5.5	0 0	76.49
229	"	"	"	"	5.0, 6.0	3 40 W	76.62

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
°			"			
354.64	5	3	1.19	6	4	Pale yellow. Difficult object.
352.60	1	3	1.09	6	1	Not separated.
353.07	2	2	0.98	4	2	Observer J. Not separated.
64.28	4	2	3.03	6	2	Observation uncertain.
64.36	5	1				Distance observation failed: bad definition.
230.17	6	2	3.31	6	3	A Light yellow. B Deep blue.
231.83	6	3	3.18	6	3	A White. B Blue.
230.69	5	3	3.25	6	3	Observer J.
208.25	4	1	2.47	4	1	Definition very bad.
209.08	6	3	2.66	6	3	Observer J.
107.68	6	3	13.89	6	3	A White. B Bluish white.
106.97	6	2	13.88	6	2	A Bluish white. B Blue.
192.85	2	1	5.04	4	1	Slightly blue.
192.08	6	3	4.71	6	3	Light blue.
192.97	6	4	4.92	6	4	Observer J.
192.83	6	4	5.35	6	4	Faint from passing light cloud.
192.45	6	2	4.90	6	3	Light blue.
			1.26	2	1	Distance merely estimation. Cloudy.
19.93	6	4	1.36	6	2	White.
18.85	6	2	1.22	4	2	Not separated.
17.20	6	2	1.09	4	2	Not separated.
178.35	6	3	3.55	6	3	Stars nearly white.
180.29	7	2	3.85	6	2	A Light green. B Pale blue.
13.07	6	1	2.99	2	1	Stars white and faint. Cloudy.
12.90	6	2	2.79	6	2	
35.50	6	3	2.75	6	3	Stars white. Cloudy.
35.70	6	3	2.47	6	3	Stars white. Definition bad.
101.38	5	3	5.84	8	3	
103.14	5	3	6.27	6	3	Definition bad.
101.88	6	5	5.61	6	5	A White. B Reddish white.
101.30	6	4	5.82	6	4	Observed through light cirrus cloud.
328.78	4	2	3.26	4	2	A Deep yellow. B Bluish green.
331.16	5	2	2.75	8	4	B Deep blue. A daylight observation.
328.20	5	5	2.91	8	5	A Yellow. B Blue. Observed in daylight.
327.57	7	2	3.08	8	1	Definition very bad: at times stars not separated.
331.62	5	2	3.00	6	2	Daylight observation.
328.72	6	4	2.82	6	4	A Yellow. B Blue.
45.80	5	5	3.97	8	5	A Slightly blue. B Blue.
43.50	4	3	3.41	6	2	B Purple. Sky generally cloudy.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	° ' "		h. m.	1800 +
230	ξ Bootis .....	6146	14 45 51	70 24.0	6.0, 7.5	2 20 E	76.41
231	" .....	"	"	"	5.0, 8.0	1 35 W	76.53
232	" .....	"	"	"	5.0, 8.0	1 55 W	76.53
233	" .....	"	"	"	5.0, 8.0	3 10 W	76.60
234	" .....	"	"	"	4.0, 7.5	0 40 E	77.43
235	" .....	"	"	"	5.0, 8.0	0 10 W	77.45
236	" .....	"	"	"	4.0, 6.9	2 0 W	77.48
237	" .....	"	"	"	5.5, 6.5	2 0 W	77.52
238	OS 288 .....	6161	14 47 46	73 47.5	6.0, 7.0	3 40 W	76.52
239	" .....	"	"	"	7.0, 7.5	1 0 W	77.49
240	44 Bootis .....	6237	14 59 52	41 52.8	5.0, 6.0	0 45 E	76.49
241	" .....	"	"	"	5.0, 6.0	2 5 W	76.55
242	" .....	"	"	"	5.0, 6.0	3 10 W	76.61
243	" .....	"	"	"	6.0, 7.2	4 0 W	77.62
244	" .....	"	"	"	5.0, 5.6	4 45 W	77.66
245	" .....	"	"	"	5.0, 5.6	4 15 W	77.66
246	" .....	"	"	"	4.5, 5.0	4 20 W	77.66
247	OS 295 .....	6311	15 10 25	52 44.4	8.0, 9.0	3 45 W	76.52
248	Σ 1932 .....	6331	15 13 12	62 43.5	6.0, 7.0	1 45 W	76.49
249	η Coronæ .....	6362	15 18 15	59 16.5	6.0, 6.0	1 10 W	77.53
250	δ Serpentis .....	6426	15 29 5	79 3.5	5.0, 6.0	0 0	76.41
251	" .....	"	"	"	5.0, 6.0	0 35 W	76.50
252	" .....	"	"	"	5.0, 6.5	0 0	77.46
253	" .....	"	"	"	5.0, 6.5	0 16 W	77.49
254	OS 303 .....	6575	15 55 16	76 22.8	8.0, 9.0	3 20 W	76.61
255	" .....	"	"	"	...	3 55 W	76.61
256	ξ Scorpi .....	6582	15 57 46	101 2.4	6.0, 6.0	0 10 W	76.54
257	49 Serpentis .....	6634	16 7 42	76 8.2	7.0, 7.0	0 15 E	76.38
258	" .....	"	"	"	6.0, 7.0	1 45 W	76.50
259	" .....	"	"	"	6.0, 7.0	3 15 W	76.64
260	σ Coronæ .....	6654	16 10 12	55 50.1	6.0, 7.0	3 0 W	76.49
261	" .....	"	"	"	6.0, 7.0	3 20 W	76.54
262	" .....	"	"	"	...	3 0 W	76.54
263	" .....	"	"	"	6.5, 7.5	2 10 W	77.62
264	" .....	"	"	"	6.0, 6.7	4 10 W	77.65
265	" .....	"	"	"	5.0, 6.5	3 30 W	77.66
266	" .....	"	"	"	5.0, 6.7	3 0 W	77.66
267	" .....	"	"	"	...	2 30 W	77.66



Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
0			"			
283.27	6	2	4.18	4	2	
283.40	6	4	4.21	4	4	A Yellow. B Purple.
284.98	6	5	3.95	4	5	A Light yellow. B Blue.
282.95	6	5	4.07	6	5	A White. B Blue. Cloudy.
281.22	6	4	4.25	6	4	A White. B Blue.
281.27	4	1				Badly defined and unsteady.
281.77	6	4	4.37	6	4	A White. B Lilac.
279.97	6	2	4.54	6	2	A Light yellow. B Blue. Vision indifferent.
197.50	6	2	1.2			Difficult object: clouds passing. Dist. estimated.
194.05	6	4	1.12	6	4	Stars white. Well seen.
240.64	6	3	4.80	5	3	
240.43	9	2	5.11	8	2	Yellowish white. Sky very transparent.
239.68	6	3	5.00	6	3	Stars white.
241.78	6	3	4.62	6	3	A Pale yellow. B White. Sky somewhat hazy.
241.37	6	2	4.62	6	2	A Yellow. B Bluish white.
240.32	6	3	4.76	6	3	White.
241.38	6	3	4.71	6	3	Light yellow.
116.90	2	0	0.9			Clouds prevented further obs. Dist. estimated.
298.80	4	2	1.11	8	3	Both stars white. Not separated. Very difficult.
71.87	4	0	1.0			Pale yellow stars. Distance estimated.
189.13	6	1	4.20	6	1	Images very unsteady. Distance uncertain.
187.84	5	5	3.53	8	5	Both stars white. Definition very good.
188.95	6	1	3.76	6	1	A White. B Bluish white. Sky hazy.
189.03	6	4	4.03	6	4	Greenish white.
132.45	4	2	0.92	4	2	Image very tremulous and observation difficult.
133.03	4	2	0.97	4	2	Observer J.
182.55	6	2	1.0			Stars only elongated. Distance estimated.
148.38	4	3	4.22	4	2	Both white. Very tremulous.
148.74	5	3	4.09	10	4	White stars. Definition very indifferent.
			3.81	6	1	Cloudy: not a good observation.
198.24	5	2	4.05	6	2	A White. B Yellowish white. Sky cloudy.
198.48	6	3	3.60	6	3	Both stars white. Definition indifferent.
201.43	6	3				-
202.73	6	3	3.85	8	3	Yellowish. Observer J.
201.63	6	2	3.58	6	2	Light yellow. Cloudy.
201.78	6	2	3.51	6	2	A White. B Bluish white.
202.63	6	4	3.58	6	4	A White. B Very light blue.
202.38	6	2	3.57	6	2	Sky very cloudy.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	°		h. m.	1800 +
268	$\lambda$ Ophiuchi.....	6727	16 24 51	87 45.1	4.0, 6.0	0 20 E	76.50
269	"	"	"	"	4.0, 6.0	0 40 W	76.53
270	"	"	"	"	4.0, 6.0	1 10 W	76.54
271	"	"	"	"	4.0, 6.0	0 30 W	76.61
272	$\zeta$ Herculis .....	6799	16 36 47	58 10.9	3.0, 7.0	1 30 E	76.61
273	$\Sigma$ 2107 .....	6847	16 47 6	61 8.0	6.0, 10.0	1 30 W	76.64
274	$\Sigma$ 2120 .....	6910	17 0 0	61 44.7	7.0, 11.0	2 45 E	76.41
275	"	"	"	"	7.0, 10.0	2 0 W	76.53
276	"	"	"	"	7.0, 9.5	2 0 W	76.55
277	"	"	"	"	7.0, 9.0	0 55 W	76.64
278	"	"	"	"	8.0, 9.5	2 30 W	77.62
279	"	"	"	"	7.0, 9.5	2 0 W	77.66
280	"	"	"	"	...	2 0 W	77.66
281	"	"	"	"	7.0, 9.3	1 30 W	77.66
282	"	"	"	"	7.5, 10.5	2 20 W	77.67
283	$\mu$ Draconis.....	6935	17 2 50	35 22.4	6.0, 6.0	1 55 W	76.38
284	36 Ophiuchi .....	6946	17 7 59	116 25.5	6.5, 6.5	0 10 W	76.54
285	"	"	"	"	6.0, 6.5	0 15 W	76.55
286	"	"	"	"	5.0, 5.5	0 30 W	76.61
287	$\delta$ Herculis .....	6968	17 10 6	65 1.0	4.0, 8.0	1 0 W	76.59
288	$\rho$ Herculis .....	7016	17 19 32	52 44.6	5.0, 6.0	1 45 E	76.38
289	"	"	"	"	4.0, 5.0	2 27 W	76.51
290	"	"	"	"	4.0, 5.0	3 18 W	76.55
291	"	"	"	"	5.0, 7.0	1 50 W	76.64
292	53 Ophiuchi .....	7064	17 28 55	80 19.9	...	0 35 W	76.56
293	61 Ophiuchi .....	7110	17 38 32	87 21.7	...	1 40 W	76.59
294	$\tau$ Ophiuchi....	7245	17 56 33	98 10.7	5.0, 6.0	1 15 W	76.55
295	"	"	"	"	...	1 35 W	76.55
296	70 Ophiuchi .....	7273	17 59 23	87 27.7	5.0, 7.0	1 5 E	76.44
297	"	"	"	"	5.0, 7.0	0 35 E	76.50
298	"	"	"	"	6.0, 7.0	1 0 E	76.56
299	"	"	"	"	5.0, 7.0	0 10 W	76.60
300	"	"	"	"	7.0, 8.0	1 0 W	77.62
301	"	"	"	"	5.0, 6.5	2 0 W	77.66
302	"	"	"	"	5.0, 5.5	0 46 W	77.66
303	"	"	"	"	5.0, 5.5	1 0 W	77.66
304	"	"	"	"	5.0, 5.5	0 15 W	77.67

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
°			"			
31.55	6	2				Both stars white. Definition bad.
30.56	4	2	1.82	6	2	White stars.
31.37	7	4				White. Seen well at times.
31.95	6	0	1.4			Observation worth very little. Dist. estimated.
140.10	3	3	1.2			Distance estimated.
208.50	4	3	0.99	4	2	White. Distance doubtful.
258.12	5	3	4.39	10	3	Observed with illuminated wires.
258.32	6	2				Very difficult object. Observer J.
257.77	6	2	4.23	8	2	B Bluish green. Sky very transparent.
258.08	6	2	4.25	6	2	A White. B Blue.
257.07	6	3	4.56	6	3	A White. B Blue.
256.53	6	3	4.47	6	3	A Reddish white. B Blue.
256.55	6	5	4.30	6	5	A Ruddy. B Bluish.
256.38	6	3	4.28	6	2	A Ruddy. B Light blue.
255.82	6	2				Sky misty: B too faint for distance observation.
172.54	4	2	3.00	4	2	White stars. Definition bad.
203.07	6	4				Fairly well seen for the low altitude.
202.99	6	4	4.07	8	4	
204.08	6	3	4.27	6	3	
178.78	4	1	18.35	12	4	A Yellow. B Lilac.
310.32	4	2	4.02	4	2	White stars.
312.84	6	1	4.05	8	1	White stars. Definition very bad.
311.68	6	2	3.58	8	4	
310.00	4	3	3.47	6	2	Definition bad.
190.50	3	1	41.30	12	4	
			20.60	12	4	
250.12	7	5	1.64	10	5	Both stars white. Superb definition.
249.45	4	3	1.5			Distance estimated.
80.48	6	1				A Yellow. B Blue. Def. too bad for obs. of dist.
80.80	5	4	3.62	8	4	A Yellow. B Purplish blue.
79.43	6	1	3.53	8	1	A Yellow. B Blue. Bad definition.
79.52	7	3	3.45	6	3	
78.75	6	4	3.29	6	4	A Slightly yellow.
79.10	6	2	3.62	6	2	A White. B Greyish white. Cloudy.
78.52	6	4	3.44	6	4	A White. B Bluish white.
78.02	6	2	3.29	6	2	Definition bad.
78.23	6	3	3.36	6	3	A White. B Bluish white.

Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	° ' "		h. m.	1800 +
305	Σ 2278, A B .....	7297	18 0 48	33 34.0	8.0, 8.5	...	76.43
306	" BC .....	"	"	"	8.5, 8.5	...	76.43
307	Σ 2330 .....	7444	18 25 41	76 54.1	7.0, 10.0	1 0 W	76.59
308	OΣ 358 .....	7479	18 30 33	73 5.9	6.0, 7.0	0 30 W	76.55
309	" .....	"	"	"	...	...	76.55
310	" .....	"	"	"	7.0, 8.0	0 30 W	76.61
311	Σ 2360 .....	7510	18 34 12	69 10.5	8.0, 9.0	5 0 W	76.58
312	" .....	"	"	"	8.0, 9.5	0 30 W	76.60
313	" .....	"	"	"	8.0, 9.0	0 45 W	76.61
314	ε Lyre .....	7564	18 40 22	50 27.4	6.0, 7.0	3 0 E	76.45
315	5 Lyre ... ..	7566	18 40 25	50 31.3	5.5, 5.5	2 30 E	76.45
316	ζ Lyre .....	7569	18 40 38	52 31.2	4.0, 6.5	0 50 E	76.56
317	Σ 2455 .....	7753	19 1 47	68 0.6	8.0, 10.0	1 0 W	76.60
318	δ Cygni .....	8153	19 41 13	45 9.7	3.0, 8.0	0 10 E	76.56
319	ε Draconis .....	8240	19 48 35	20 2.3	5.0, 11.0	1 30 E	76.58
320	" .....	"	"	"	3.0, 9.0	7 0 W	76.99
321	Σ 2690 .....	8600	20 25 30	79 8.6	8.0, 8.0	3 10 E	76.51
322	" .....	"	"	"	...	2 45 E	76.55
323	" .....	"	"	"	7.5, 7.5	1 0 E	77.59
324	" .....	"	"	"	7.5, 7.7	0 30 E	77.62
325	Σ 2708 .....	8692	20 34 8	51 47.7	7.0, 9.5	1 55 E	76.55
326	" .....	"	"	"	7.5, 9.0	3 30 W	76.94
327	" .....	"	"	"	7.0, 9.0	0 20 E	77.62
328	" .....	"	"	"	7.0, 9.5	1 0 E	77.67
329	49 Cygni .....	8710	20 36 11	58 7.2	7.5, 9.0	2 20 E	76.55
330	" .....	"	"	"	7.0, 9.0	1 40 E	76.64
331	" .....	"	"	"	6.0, 10.0	3 30 W	76.94
332	Σ 2741 .....	8850	20 54 39	40 0.3	6.7, 8.0	1 30 E	76.64
333	" .....	"	"	"	6.0, 8.0	7 0 W	77.07
334	Σ 2744 .....	8860	20 56 58	88 56.3	7.0, 9.0	1 30 E	76.65
335	61 Cygni .....	8898	21 1 31	51 50.4	5.0, 6.0	1 30 E	76.56
336	" .....	"	"	"	...	3 30 W	76.94
337	" .....	"	"	"	5.6, 6.5	0 30 E	77.75
338	" .....	"	"	"	5.0, 5.6	1 0 E	77.75
339	" .....	"	"	"	5.0, 5.6	1 0 E	77.75
340	" .....	"	"	"	5.0, 5.6	1 30 E	77.76
341	" .....	"	"	"	5.0, 5.6	1 30 E	77.76
342	" .....	"	"	"	5.0, 5.6	3 0 W	77.81
343	" .....	"	"	"	5.0, 5.6	3 0 W	77.82

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
0			"			
32.05	4	1				Definition very bad. Observation doubtful.
147.83	7	1				
174.10	4	1	19.46	8	3	A Greenish. B Grey.
200.96	5	4	1.76	6	4	
200.67	4	4				
200.93	6	4	1.63	6	2	White stars. Distance-measure doubtful.
0.23	6	1	2.68	8	1	A Yellow. B Blue.
0.00	6	3	2.51	6	3	A Reddish white. B White.
359.47	4	1	2.6			A White. B Light blue. Distance estimated.
17.33	5	2	3.31	6	2	A White. B Reddish white.
138.60	4	2	2.84	6	2	White stars. Observed before sunset.
150.13	3	4	43.93	16	4	A Yellow. B Purple.
102.47	8	3	3.50	4	3	Grey stars. Definition bad.
329.93	4	1				Elongation doubtful.
4.26	7	1				Observed with illuminated wires. Cloudy.
5.57	6	0	3.29	6	0	A White. B Blue.
255.08	6	5	15.14	6	5	Good observation.
253.92	4	4	15.18	6	4	
254.82	6	5	15.15	6	5	Observer J. Stars blue.
254.80	6	2	15.04	6	4	Stars blue. Sky generally cloudy.
333.05	4	3	21.79	6	3	
332.75	6	4	21.94	8	4	
334.10	6	4	22.01	6	3	Observer J. Blue stars.
333.50	6	2	21.56	6	2	Stars bluish white.
51.49	5	1	3.27	6	1	Bluish white.
49.06	5	2	2.87	6	1	A Yellow. B Bluish. Sometimes not separated.
48.84	5	4	2.93	6	4	A White. B Blue. Difficult.
29.05	4	3	2.00	6	4	White stars.
31.48	5	3	2.29	6	3	
169.52	4	2	1.62	2	0	Difficult and unsatisfactory.
116.65	4	4	19.90	10	4	
116.08	6	4	20.16	6	4	A Gold. B Yellow.
116.30	6	3	19.48	6	3	Stars light yellow. Foggy.
116.22		3	19.72		3	Observed with the "Duplex Micrometer."
117.02	6	2	19.86	6	3	Yellow stars. Very foggy.
116.71	6	1	19.83	8	1	Light yellow. Dense fog.
116.55	6	3	19.83	6	3	Stars yellow.
116.00	6	2	19.80	4	1	Cloudy.
115.91	6	4	19.91	6	4	Stars golden.

Refer- ence Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.	'		h. m.	1800 +
344	$\Sigma$ 2760 .....	8902	21 1 53	56 20.9	7.0, 8.0	2 40 E	76.64
345	" .....	"	"	"	8.0, 8.3	4 0 W	76.94
346	OS 432 .....	8976	21 9 44	49 20.3	...	1 20 E	76.66
347	" .....	"	"	"	8.0, 9.0	4 10 W	76.94
348	" .....	"	"	"	8.0, 8.5	5 0 W	76.99
349	OS 437 .....	9021	21 15 47	58 3.5	8.0, 8.5	2 30 E	76.66
350	" .....	"	"	"	7.0, 7.5	4 0 W	76.94
351	$\Sigma$ 2799 .....	9072	21 23 3	79 26.4	7.0, 7.5	2 20 E	76.66
352	" .....	"	"	"	8.0, 8.2	2 0 W	77.81
353	" .....	"	"	"	7.5, 7.5	2 40 W	77.82
354	" .....	"	"	"	7.5, 7.5	2 35 W	77.85
355	" .....	"	"	"	8.0, 8.2	4 20 W	77.88
356	$\Sigma$ 2804 .....	9107	21 27 26	69 49.0	7.0, 8.0	2 10 E	76.66
357	" .....	"	"	"	7.5, 8.0	2 40 W	76.95
358	" .....	"	"	"	7.2, 8.0	1 50 W	77.81
359	" .....	"	"	"	7.8, 8.3	2 20 W	77.82
360	" .....	"	"	"	7.0, 7.5	1 40 W	77.85
361	" .....	"	"	"	...	4 0 W	77.85
362	$\mu$ Cygni .....	9210	21 38 45	61 47.8	4.5, 6.0	2 30 W	76.91
363	" .....	"	"	"	4.0, 6.0	3 10 W	76.95
364	" .....	"	"	"	4.0, 5.6	1 0 E	77.75
365	" .....	"	"	"	4.0, 5.6	1 30 E	77.75
366	" .....	"	"	"	...	1 20 E	77.75
367	$\zeta$ Aquarii .....	9580	22 22 39	90 38.0	5.0, 5.0	1 45 E	76.53
368	" .....	"	"	"	5.0, 6.0	0 0	76.56
369	" .....	"	"	"	...	0 30 W	76.56
370	" .....	"	"	"	5.0, 5.1	1 45 W	76.88
371	" .....	"	"	"	...	1 45 E	77.75
372	" .....	"	"	"	4.0, 4.5	0 45 W	77.77
373	" .....	"	"	"	4.0, 4.5	0 40 W	77.81
374	" .....	"	"	"	4.0, 4.5	1 0 W	77.82
375	" .....	"	"	"	4.5, 5.0	1 20 W	77.83
376	" .....	"	"	"	4.0, 4.5	0 14 W	77.85
377	" .....	"	"	"	...	0 35 W	77.85
378	$\Sigma$ 2944 .....	9742	22 41 40	94 50.8	7.0, 7.5	1 40 W	76.91
379	" .....	"	"	"	7.0, 7.5	3 30 W	76.95
380	" .....	"	"	"	...	4 0 W	76.95
381	$\epsilon$ 2 Pegasi .....	9840	22 53 12	78 54.4	6.0, 8.0	0 15 W	76.92
382	" .....	"	"	"	...	0 35 W	76.92

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
0			"			
223.42	4	5	8.40	6	5	A Yellow. B Light blue.
225.60	6	3	9.12	8	4	A Yellow. B White.
125.95	3	1	1.19	6	2	Interrupted by cloud.
124.22	6	4	1.34	6	4	Stars in contact.
124.73	6	2	1.43	6	2	Clouds passing.
48.15	4	5	1.60	6	5	
52.65	5	4	1.52	6	4	A Yellow. B White.
131.58	4	4	1.20	2	2	
309.98	6	4	1.37	6	4	White stars. Only elongated.
307.80	6	2	1.34	6	2	Not separated.
308.45	4	0				Elongated. Observation unsatisfactory.
309.45	6	3	1.37	6	3	Generally well separated.
326.30	4	2	3.18	6	3	White stars.
327.72	4	0	2.80	4	0	In one mass.
326.88	6	3	2.76	6	3	Stars light blue.
324.97	6	4	3.08	6	4	Stars lilac or light blue.
324.98	6	2	3.06	8	3	Light blue. Cloudy.
325.27	6	5	2.79	6	5	Pale blue.
118.53	6	3	3.77	6	3	B Blue.
119.75	6	4	3.68	6	4	A Yellow. B Blue.
118.83	6	2	3.90	4	2	A Light yellow. B Blue.
120.01	6	3	3.85	8	3	B Light blue.
118.90	3	3	3.80	3	3	Observer J.
336.30	6	1				Stars white. Definition bad.
335.84	5	0	4.07	6	0	At times not separated.
337.93	3	1	3.85	3	1	Definition bad. Observer J.
338.80	6	2	3.74	6	4	Stars white. Cloudy at times.
338.33	6	0				Stars like a mass of wool.
338.67	6	3	3.48	8	3	Stars white. Definition fair.
338.28	6	3	3.41	8	3	
336.72	6	4	3.53	8	4	Sky hazy.
338.42	6	4	3.46	8	4	Stars white.
338.17	6	4	3.44	6	4	
337.17	4	3	3.50	4	4	
254.80	6	3	3.53	6	3	Blue stars.
255.50	4	1	3.75	6	1	Definition indifferent.
255.23	4	3	3.88	6	2	Observer J.
203.32	4	3	0.9			Distance estimated.
203.70	4	3				



Reference Number.	Star's Name.	No. in R.A.S. Cata- logue.	Approximate R.A. 1880.0.	Approximate N.P.D. 1880.0.	Estimated Magnitudes at the time of Obs.	Distance from Meridian.	Date.
			h. m. s.			h. m.	1800 +
383	$\Sigma$ 2995 .....	9968	23 10 23	92 14.5	8.0, 8.5	2 0 W	76.85
384	"	"	"	"	7.5, 7.9	1 30 W	76.93
385	"	"	"	"	7.0, 7.5	1 55 W	76.93
386	"	"	"	"	7.0, 7.5	0 50 W	76.94
387	$\Sigma$ 3006 .....	10004	23 15 25	55 12.8	9.0, 9.5	2 0 W	76.91
388	"	"	"	"	9.0, 10.5	3 10 W	76.94
389	$\Sigma$ 3008 .....	10020	23 17 33	99 7.1	6.0, 6.7	0 50 W	76.85
390	"	"	"	"	6.7, 7.5	1 0 W	76.93
391	"	"	"	"	5.6, 6.5	1 0 W	76.94
392	$\sigma$ Cassiopeie .....	10254	23 52 56	34 54.3	5.6, 7.8	3 10 W	77.04
393	$\Sigma$ 3057 .....	10292	23 58 43	32 8.1	6.0, 11.0	5 0 W	76.58
394	$\Sigma$ 3061 .....	10299	23 59 35	72 49.6	7.0, 7.5	2 10 W	76.91
395	"	"	"	"	8.0, 8.5	0 34 W	76.94
396	$\Sigma$ 3062 .....	10304	23 59 57	32 14.0	6.0, 8.0	6 0 E	76.65
397	"	"	"	"	6.7, 7.8	3 10 W	76.94
398	"	"	"	"	6.0, 6.7	3 30 W	77.04
399	"	"	"	"	7.0, 7.4	8 30 W	77.16
400	"	"	"	"	...	9 15 W	77.16

Concluded Position Angle.	No. of Mea- sures.	Weight.	Con- cluded Dis- tance.	No. of Mea- sures.	Weight.	NOTES.
o			"			
27.92	6	4				White stars. Definition bad.
27.26	6	4	4.80	6	3	Observer J.
27.98	6	4	5.01	6	3	Slightly blue. Tremulous.
30.72	6	5	5.09	8	5	Ashen grey. Definition good.
169.83	6	4	5.00	6	4	Sky cloudy.
169.63	4	0				
257.35	6	4	4.64	8	4	Stars pale blue. Slight fog.
255.80	6	4	4.80	6	4	Stars slightly green.
257.87	6	4	4.73	6	3	A Light gold. B Light green.
323.69	6	4	2.62	6	4	A White. B Pale green.
294.62	6	1				
145.30	6	2	6.92	6	2	
146.42	6	1				Further observation prevented by cloud.
294.18	6	1	1.55	6	1	Observation very unsatisfactory.
295.04	6	2	1.47	6	2	A White. B Yellow.
293.57	6	4	1.40	6	4	Stars straw-coloured.
294.27	6	5	1.48	6	5	Stars straw-coloured.
295.57	6	4				

Reference No.	Star's Designation.	Position Angle.	No. of Observations.	No. of Nights.	Weight.	Distance.	No. of Observations.	No. of Nights.	Weight.	Epoch 1800 +
2	$\Sigma$ 23.....	351.58	24	4	14	8.20	28	4	14	77.46
6	O $\Sigma$ 9 .....	56.85	10	2	9	...	...	...	...	76.86
7	O $\Sigma$ 9 .....	...	...	...	...	1.48	6	1	5	77.07
8	$\eta$ Cassiopeiae .....	149.06	35	6	18	5.48	38	6	18	76.79
14	36 Andromedae ..	358.25	22	4	10	1.49	16	4	8	77.19
19	$\Sigma$ 86.....	160.05	19	3	9	12.65	18	3	9	76.94
22	$\Sigma$ 90.....	82.63	15	3	9	32.89	18	3	9	77.00
25	42 Ceti.....	349.32	17	3	9	...	...	...	...	77.28
26	42 Ceti.....	...	...	...	...	1.38	14	2	6	77.47
29	$\Sigma$ 138 .....	30.15	18	3	6	1.46	20	3	8	77.32
33	$\Sigma$ 155 .....	329.65	30	5	15	4.74	24	4	14	77.21
39	$\alpha$ Piscium .....	325.90	28	5	13	3.00	28	5	13	77.18
44	$\epsilon$ Cassiopeiae .....	265.66	10	2	6	2.06	9	2	5	76.72
49	$\Sigma$ 269 .....	342.18	10	2	2	1.61	12	2	2	76.94
51	$\gamma$ Ceti .....	291.08	18	3	9	2.73	18	3	9	77.31
54	$\Sigma$ 300 .....	299.95	18	3	14	2.79	18	3	14	77.02
57	$\Sigma$ 305 .....	320.97	18	3	10	2.77	18	3	10	77.33
62	$\Sigma$ 422 .....	242.93	18	3	10	5.91	18	3	10	77.00
65	32 Eridani .....	347.43	26	5	15	...	...	...	...	76.62
66	32 Eridani .....	...	...	...	...	6.81	22	4	13	76.76
71	O $\Sigma$ 72 .....	329.65	12	2	7	...	...	...	...	76.57
72	O $\Sigma$ 72 .....	...	...	...	...	4.97	6	1	5	77.07
78	14 Orionis .....	208.46	15	2	6	1.18	12	2	6	77.14
80	14 Aurigae .....	225.13	14	3	5	...	...	...	...	76.79
81	14 Aurigae .....	...	...	...	...	14.80	13	2	5	77.04
84	$\Sigma$ 694 .....	0.70	12	2	8	1.24	12	2	8	77.08
86	$\Sigma$ 697 .....	284.83	12	2	9	25.96	12	2	9	77.07
88	$\Sigma$ 712 .....	56.09	12	2	5	3.17	12	2	5	77.08
91	$\Sigma$ 742 .....	254.42	24	4	13	3.16	24	4	13	77.11
95	$\Sigma$ 835 .....	147.06	12	2	8	2.10	6	1	4	77.08
99	$\Sigma$ 877 .....	...	...	...	...	5.27	6	1	5	77.09
99	$\Sigma$ 877 .....	263.86	12	2	10	...	...	...	...	77.15
104	$\Sigma$ 932 .....	330.83	12	2	8	2.07	12	2	8	77.15
106	15 Monocerotis, A B	211.14	8	2	3	...	...	...	...	76.66
108	15 Monocerotis, A C	12.00	10	2	3	...	...	...	...	76.66
110	38 Geminorum.....	162.78	19	4	12	...	...	...	...	76.60
110	38 Geminorum.....	...	...	...	...	6.37	14	3	11	76.74
114	$\Sigma$ 1037.....	312.29	18	3	14	1.36	18	3	14	77.13
117	$\Sigma$ 1083.....	46.63	7	2	4	...	...	...	...	76.24
118	$\Sigma$ 1083 .....	...	...	...	...	7.83	4	1	1	76.29

Reference No.	Star's Designation.	Position Angle.	No. of Observations.	No. of Nights.	Weight.	Distance.	No. of Observations.	No. of Nights.	Weight.	Epoch 1800 +
		°				"				
119	Castor .....	234.18	38	7	25	...	...	...	...	76.74
119	Castor .....	...	...	...	...	5.58	28	5	17	76.66
127	ζ Cancri, A B .....	110.33	19	3	13	0.81	6	2	9	77.23
130	ζ Cancri, A C .....	130.74	12	2	5	4.95	12	2	5	77.20
132	υ Cancri .....	40.79	13	3	9	6.19	16	3	8	76.62
135	φ <sup>2</sup> Cancri.....	214.47	18	3	10	4.69	16	3	10	76.81
138	Σ 1263 .....	18.91	6	2	4	38.57	3	1	3	76.36
140	ε Hydræ .....	216.67	10	2	3	3.67	9	2	3	76.73
144	Σ 1355.....	330.94	10	2	6	2.60	9	2	6	76.73
146	ω Leonis .....	71.17	18	5	9	0.54	5	1	3	77.21
151	γ Leonis .....	111.83	7	2	8	...	...	...	...	76.42
152	γ Leonis .....	...	...	...	...	3.51	6	1	3	76.48
153	35 Sextantis.....	239.57	7	2	6	7.37	7	2	6	76.36
156	ξ Ursæ Majoris ...	301.20	25	5	18	1.52	21	4	15	76.46
161	ξ Ursæ Majoris ...	297.02	39	7	25	1.57	36	6	20	77.20
168	Σ 1527.....	11.38	14	3	7	3.48	13	3	7	76.57
171	ι Leonis .....	67.68	17	3	6	2.86	16	3	6	77.10
174	57 Ursæ Majoris ...	6.66	18	3	12	5.47	18	3	12	76.82
177	Σ 1553.....	169.12	11	2	7	5.66	14	2	7	76.94
179	γ Virginis.....	160.04	28	5	13	4.65	21	4	13	77.24
185	Σ 1678.....	201.06	18	4	10	...	...	...	...	76.95
186	Σ 1678.....	...	...	...	...	32.28	18	3	11	77.16
189	35 Comæ .....	61.26	10	2	4	1.34	6	2	3	77.00
191	OΣ 261.....	353.48	8	3	8	1.11	16	3	7	77.20
196	ο Virginis .....	230.99	17	3	8	3.25	18	3	9	77.51
199	Σ 1785.....	208.87	10	2	4	2.61	10	2	4	76.42
201	Σ 1812.....	107.40	12	2	5	13.89	12	2	5	77.51
203	Σ 1813.....	192.66	26	5	14	5.00	28	5	15	77.27
208	Σ 1819 .....	...	...	...	...	1.23	16	4	7	77.27
209	Σ 1819.....	18.98	18	3	8	...	...	...	...	77.47
212	Σ 1825.....	179.13	13	2	5	3.67	12	2	5	77.51
214	Σ 1842.....	12.96	12	2	3	2.86	8	2	3	77.51
216	Σ 1858.....	35.60	12	2	6	2.61	12	2	6	77.51
218	π Boötis .....	101.88	22	4	15	5.84	26	4	15	76.96
222	ε Boötis .....	329.07	32	6	17	2.92	40	6	18	76.70
228	39 Boötis .....	44.94	9	2	8	3.81	14	2	7	76.56
230	ξ Boötis .....	283.76	24	4	16	4.08	18	4	16	76.52
234	ξ Boötis .....	281.29	22	4	11	4.36	18	3	10	77.47
238	OΣ 288 .....	195.20	12	2	6	...	...	...	...	77.00
239	OΣ 288 .....	...	...	...	...	1.12	6	1	4	77.49

Refer- ence No.	Star's Designation.	Position Angle.	No. of Observ- ations.	No. of Nights.	Weight.	Dis- tance.	No. of Observ- ations.	No. of Nights.	Weight.	Epoch 1800 +
		°				"				
240	44 Bootis .....	240.68	45	7	19	4.80	43	7	19	77.18
250	δ Serpentis .....	188.50	23	4	11	3.79	26	4	11	76.97
254	0Σ 303 .....	132.74	8	2	4	0.95	8	2	4	76.61
257	49 Serpentis .....	148.56	9	2	6	...	...	...	...	76.44
257	49 Serpentis .....	...	...	...	...	4.09	20	3	7	76.51
260	σ Coronæ .....	199.17	17	3	8	3.78	12	2	5	76.52
263	σ Coronæ .....	202.33	30	5	13	3.62	32	5	13	77.65
268	λ Ophiuchi .....	31.21	23	4	8	1.82	6	1	2	76.53
274	Σ 2120 .....	258.09	23	4	9	4.30	24	3	7	76.53
278	Σ 2120 .....	256.51	30	5	16	4.39	24	4	13	76.65
284	36 Ophiuchi .....	203.32	18	3	11	4.16	14	2	7	76.57
288	ρ Herculis .....	310.86	20	4	8	3.71	26	4	9	76.52
294	τ Ophiuchi .....	249.87	11	2	8	1.64	10	1	5	76.55
296	70 Ophiuchi .....	80.18	24	4	9	3.55	22	3	8	76.54
300	70 Ophiuchi .....	78.53	30	5	15	3.39	30	5	15	77.65
308	0Σ 358 .....	200.85	15	3	12	1.72	12	2	6	76.57
311	Σ 2360 .....	359.94	16	3	5	2.55	14	2	4	76.50
321	Σ 2690 .....	254.67	22	4	16	15.13	24	4	18	77.07
325	Σ 2708 .....	333.35	22	4	13	21.86	26	4	12	77.20
329	49 Cygni .....	49.28	15	3	7	2.98	18	3	6	76.71
332	Σ 2741 .....	30.27	9	2	6	2.12	12	2	7	76.86
335	61 Cygni .....	116.37	10	2	8	20.03	16	2	8	76.75
337	61 Cygni .....	116.31	36	7	18	19.78	36	7	18	77.77
344	Σ 2760 .....	224.24	10	2	8	8.72	14	2	9	76.79
346	0Σ 432 .....	124.61	15	3	7	1.32	18	3	8	76.86
349	0Σ 437 .....	50.15	9	2	9	1.56	12	2	9	76.80
351	Σ 2799 .....	310.01	26	5	13	1.33	20	4	11	77.54
356	Σ 2804 .....	325.59	32	6	16	2.96	32	6	18	77.60
362	μ Cygni .....	119.26	27	5	15	3.79	27	5	15	77.42
367	ξ Aquarii .....	337.99	60	1	25	...	...	...	...	77.32
367	ξ Aquarii .....	...	...	...	...	3.52	57	9	27	77.54
378	Σ 2944 .....	255.08	14	3	7	3.68	18	3	6	76.94
381	52 Pegasus .....	203.51	8	2	6	...	...	...	...	76.92
383	Σ 2995 .....	28.60	24	4	17	...	...	...	...	76.91
384	Σ 2995 .....	...	...	...	...	4.99	20	3	11	76.93
389	Σ 3008 .....	257.01	18	3	12	4.72	20	3	11	76.91
394	Σ 3061 .....	145.67	12	2	3	6.92	6	1	2	76.92
396	Σ 3062 .....	294.52	30	5	16	1.46	24	4	12	76.99

III.

OBSERVATIONS

OF

THE COMETS

OF

BORRELLY, WINNECKE, SWIFT, COGGIA, AND TEMPEL,

IN THE YEAR

1877.

Date, 1877.	Oxford Mean Time of Observation.	R.A. of Comet — R.A. of Star.	No. of Com- pari- sons.	N.P.D. of Comet — N.P.D. of Star.	No. of Com- pari- sons.	Micro- meter used.	Log. factor of Parallax in R.A.	Log. factor of Parallax in N.P.D.
	h. m. s.	m. s.		" "				
Feb. 20	8 31 18.4	+ 49 52	6	...	...	F	- 8.3922	...
20	8 47 39.9	...	...	+ 1 32.1	6	F	...	- 9.9321
26	7 45 43.7	+ 2 50.88	6	+ 13 26.0	6	...	+ 9.0805	+ 8.8652
27	7 47 30.7	+ 1 23.85	2	+ 10 59.1	2	...	+ 9.0040	+ 9.0130
27	8 8 10.6	- 6 5.53	3	- 7 40.6	3	...	+ 9.0306	+ 8.7854
28	7 25 41.7	- 22.36	8	+ 1 1.6	8	G	+ 8.8935	+ 9.1270
Mar. 5	9 51 1.7	- 1 4.33	3	+ 7 50.6	3	G	+ 8.9036	- 9.3744
5	9 51 1.7	- 1 22.67	3	+ 4 10.2	3	G	+ 8.9036	- 9.3744
5	9 53 46.5	- 2 5.20	2	+ 6 48.7	2	G	+ 8.9052	- 9.3877
6	7 37 36.1	- 2 53.50	3	+ 2 58.4	3	F	+ 8.7189	+ 7.6291
8	7 23 2.7	- 2 54.48	6	+ 1 50.8	6	G	+ 8.8599	- 7.8927
11	9 32 50.2	+ 1 3.60	3	+ 29.0	3	G	+ 8.8257	- 9.4532
14	7 46 49.6	- 37.52	9	- 1 55.1	9	F	+ 8.6825	- 9.1023
15	9 10 7.2	- 46.05	10	+ 5 47.2	10	F	+ 8.7888	- 9.4538
16	7 58 47.1	- 33.17	10	+ 4 35.8	10	F	+ 8.7007	- 9.2243
17	7 52 6.8	- 38.33	10	+ 8 42.7	10	G	+ 8.6783	- 9.2338
18	10 31 7.9	+ 32.64	7	- 53.7	7	G	+ 8.8102	- 9.6869
19	9 47 54.9	- 10 14.20	2	+ 1 45.3	3	G	+ 8.8002	- 9.6069
30	8 39 5.0	+ 58.08	6	- 37.8	6	G	+ 8.7493	- 9.5697
30	8 39 5.0	+ 18.20	5	+ 4 8.5	5	G	+ 8.7493	- 9.5697
Apr. 4	12 7 0	...	...	...	...	...	+ 8.6896	- 9.9007

Feb. 20. The comet was observed in moonlight, and though large was seen with difficulty. There was no decided nucleus, but an ill-defined central condensation to the estimated centre of which the observation refers. The diameter of the whole nebosity was estimated at 4'.

Feb. 26. In the bright moonlight the comet appeared as a faint nebula of considerable diameter without nucleus or definite condensation. The observation was considered very inexact. Observed by means of transits over wires inclined at 45° to the meridian.

Feb. 27. The comet was observed during a total lunar eclipse and was a comparatively conspicuous object. Round, five or six minutes in diameter, and with a very slightly marked condensation. No nucleus. Observed by the same method as last night.

Feb. 28. Before the moon rose the comet was seen very distinctly. The form of the nebosity was slightly elliptical, the greatest condensation being on the preceding side.

Mar. 5 and 6. Much cloud; more comparisons could not be made. Comet seen too indistinctly to notice any change in form or appearance.

Mar. 8. The atmosphere very transparent and comet easily seen, but the condensation was very slight. Diameter quite 3'.

Assumed R.A. of Comparison Star, 1877.0.	Assumed N.P.D. of Comparison Star, 1877.0.	Authority for Star's Place.	Apparent R.A. of Comet.	Apparent N.P.D. of Comet.
h. m. s.	° ' "		h. m. s.	° ' "
19 23 54.55	...	Oeltzen Argelander, No. 19288.	19 24 40.74	...
...	21 13 42.9	" "	...	21 15 35.4
*	*		*	*
*	*		*	*
*	*		*	*
3 6 8.19	21 25 2.7	+ 68°, No. 231, Bonn Obs. vol. vi.	3 5 45.08	21 25 40.2
3 51 30.93	29 35 43.1	Oeltzen Argelander, No. 4322.	3 50 26.75	29 43 11.1
3 51 48.67	29 39 24.7	" " 4332.	3 50 26.15	29 43 12.2
3 52 31.87	29 37 20.6	" " 4345.	3 50 26.82	29 43 46.7
3 57 26.80	30 45 33.5	+ 59°, No: 754, Bonn Obs. vol. vi.	3 54 33.60	30 48 9.4
4 4 56.75	32 51 22.3	Lalande 7721-2.	4 2 2.68	32 52 51.3
*	*		*	*
4 17 18.33	37 25 51.6	Oeltzen Argelander, No. 4787.	4 16 41.26	37 23 36.4
4 19 20.85	37 53 20.3	" " 4825-6.	4 18 35.23	37 58 47.7
4 20 43.08	38 24 35.5	" " 4842.	4 20 10.36	38 28 51.7
*	*		*	*
*	*		*	*
4 35 5.94	39 52 0.1	Oeltzen Argelander, No. 5081.	4 24 52.30	39 53 26.3
*	*		*	*
*	*		*	*
...	...		4 43 8	44 12 24

Mar. 11. Taken through and between clouds.

Mar. 14. The comet extremely feeble. The diameter of the entire nebulosity 90".

Mar. 15. Under favourable circumstances the comet was not visible in the telescope of four inches aperture attached to the large refractor.

Mar. 16. The comet growing rapidly fainter and smaller: the diameter about 70". The comet was near a group of several small stars, and the place was thought to be less accurate on that account.

Mar. 18. Seen rather more easily than on the 16th inst. Diameter estimated at 100".

Mar. 19. More comparisons prevented by light haze. The comet seen with the utmost difficulty.

Mar. 30. The comet large though extremely faint. Lost sight of as the moon approached the horizon.

April 4. Of the last degree of faintness. The place is very uncertain, being merely an estimation from B. D. 45°, Nos. 992 and 995.



Date, 1877.	Oxford Mean Time of Observation.	R.A. of Comet — R.A. of Star.	No. of Com- pari- sons.	N.P.D. of Comet — N.P.D. of Star.	No. of Com- pari- sons.	Micro- meter used.	Log. factor of Parallax in R.A.	Log. factor of Parallax in N.P.D.
	h. m. s.	m. s.						
Apr. 7	14 30 15.1	+ 31.90	3	— 3 27.8	2	G	— 8.6317	— 9.8884
7	14 30 15.1	— 1 10.40	3	+ 3 59.5	2	G	— 8.6317	— 9.8884
11	15 51 33.7	— 1 52.12	6	— 2 21.0	6	G	— 8.6357	— 9.8203
16	12 26 20.4	+ 50.47	3	+ 1 0.5	3	F	— 8.6066	— 9.9289
16	12 26 20.4	— 24.40	3	+ 3 11.3	3	F	— 8.6066	— 9.9289
16	12 28 6.0	+ 1 54.82	4	— 4 6.6	4	F	— 8.6076	— 9.9275
16†	12 40 43.3	+ 1 54.60	2	— 5 1.4	2	G	— 8.6142	— 9.9191
16†	12 41 29.6	+ 49.24	4	— 10.5	4	G	— 8.6149	— 9.9174
16†	12 43 2.4	— 25.07	3	+ 2 16.2	3	G	— 8.6159	— 9.9163
19	13 2 28.3	— 35.28	5	+ 7 0.0	5	F	— 8.6697	— 9.8899
19†	13 12 44.4	— 34.27	6	+ 6 33.6	6	G	— 8.6809	— 9.8754
19	13 29 40.7	— 33.70	4	+ 5 2.9	5	F	— 8.6899	— 9.8603
21	11 58 22.5	...	...	+ 1 58.5	6	F	...	— 9.9272
21	11 59 1.4	+ 1 30.86	5	...	...	F	— 8.6243	...
21†	12 20 57.5	+ 1 32.32	6	+ 9.1	6	G	— 8.6543	— 9.9094
22†	13 2 42.3	+ 1 21.14	9	— 2 37.7	9	G	— 8.7071	— 9.8669
22	13 10 12.5	— 3 4.22	6	— 6 54.3	6	G	— 8.7114	— 9.8594
23†	11 55 27.7	— 3 16.72	5	— 3 21.5	5	G	— 8.6578	— 9.9140
23	12 27 20.7	— 3 13.72	5	— 5 32.9	5	F	— 8.6906	— 9.8922
24†	11 14 16.5	— 1 22.55	6	— 3 16.1	6	G	— 8.5762	— 9.9421
24	11 32 42.8	— 1 20.27	6	— 4 55.6	6	F	— 8.6295	— 9.9302
26†	11 47 32.7	+ 1 31.88	6	+ 8 11.3	6	G	— 8.6923	— 9.9053
26	12 15 0.0	+ 1 35.33	6	+ 5 44.8	6	F	— 8.7294	— 9.8796
May 3	9 1 54.1	— 4 9.35	6	— 5 22.7	6	F	+ 8.1195	— 9.9526
4	11 24 41.7	— 3 20.34	5	+ 4 0.3	5	F	— 8.8388	— 9.8661

April 7. The comet was observed in a generally cloudy sky, but when best seen it displayed a well-defined nucleus equal in brilliancy to a star of the 8th magnitude. The coma spread itself out in a broad fan-shape, and was probably not less than  $\frac{1}{2}$  in length.

April 11. The comet not seen till near daylight, the rapid approach of which prevented the development of the tail being observed.

April 16. The nucleus was almost stellar; the coma well-defined and almost uniformly brilliant, extending to about 6' from the nucleus; the tail faint, but noticeable, and extending to about 11' from the nucleus. The comet was easily visible to the naked eye.

April 19. The nucleus measured 3".5. There did not appear to be so much bright envelope about the nucleus as on the 16th instant. The envelope was estimated to extend to 3'. Tail 1' in length.

April 21. Often cloudy. The nucleus of the same brilliancy as a star of the 5.6 magnitude. Same diameter as last night.

Assumed R.A. of Comparison Star, 1877.0.	Assumed N.P.D. of Com- parison Star, 1877.0.	Authority for Star's Place.	Apparent R.A. of Comet.	Apparent N.P.D. of Comet.
h. m. s.	° ' "		h. m. s.	° ' "
22 8 48.63	72 50 24.8	+ 17°, No. 4715, Bonn Obs. vol. vi.	22 9 20.67	72 46 58.6
22 10 30.85	72 42 56.7	+ 17°, No. 4721 " "	22 9 20.72	72 46 54.6
22 14 54.82	67 33 24.2	Weisse Bessel XXII, No. 311.	22 13 2.96	67 31 1.5
22 18 0.35	60 10 46.3	" " Nos. 354-5.	22 18 50.70	60 11 55.0
22 19 15.16	60 8 18.1	" " Nos. 375-6.	22 18 50.78	60 11 44.9
22 16 55.27	60 15 46.4	Weisse Bessel XXII, No. 401.	22 18 50.28	60 11 44.5
22 16 55.27	60 15 46.4	" " No. 401.	22 18 49.93	60 10 52.9
22 18 0.35	60 10 46.3	" " No. 354-5.	22 18 49.50	60 10 39.8
22 19 15.16	60 8 18.1	" " No. 375-6.	22 18 50.05	60 10 42.8
22 24 12.29	54 54 8.6	Leiden Obs. vol. iv, Zone 89, No. 136.	22 23 36.84	55 1 19.8
22 24 12.29	54 54 8.6	Leiden Obs. vol. iv, Zone 89, No. 136.	22 23 37.85	55 0 53.4
...	...	" " "	22 23 38.42	54 59 22.7
...	51 23 2.3	Weisse Bessel XXII, No. 547.	...	51 25 12.4
22 25 50.45	...	" " "	22 27 21.09	...
...	...	" " "	22 27 22.55	51 23 23.0
22 28 15.53	49 27 28.9	+ 40°, No. 4851, Bonn Obs. vol. vi.	22 29 36.45	49 25 2.7
22 32 42.18	49 31 3.4	+ 40°, No. 4866 " "	22 29 37.67	49 24 20.4
22 35 11.44	47 35 1.0	+ 42°, No. 4473 " "	22 31 54.39	47 31 51.0
...	...	" " "	22 31 57.39	47 29 39.5
22 35 47.93	45 38 0.4	Armagh Catalogue, No. 4996.	22 34 25.01	45 34 56.0
22 35 47.93	45 38 0.4	Armagh Catalogue, No. 4996.	22 34 27.29	45 33 16.5
22 39 3.08	41 13 58.8	Oeltzen Argelander, No. 24516-7.	22 40 33.84	41 22 23.0
...	...	" "	22 40 37.29	41 19 56.0
23 21 10.69	26 22 10.0	Rümker, No. 11193.	23 16 59.72	26 16 57.6
23 30 18.92	23 49 4.0	Rümker, No. 11396.	23 26 56.63	23 53 13.7

April 23. The tail not seen, probably on account of the moonlight. Nucleus about 4" diameter.

April 24. Comet observed through mist: not sufficiently well seen to notice any change.

April 26. Nearly full moon. Tail not traceable.

May 3. The tail apparently consists of two branches. The principal branch of about 2° in length, starts from the northern side of the envelope, and is inclined 32° to the parallel of declination. About 30° on the other side of the parallel, a much fainter branch can be traced for about 20'. The impression produced is not that the comet has two tails, but one fan-shaped tail, 60° broad, the exterior portions of which are much brighter than the interior.

May 4. The tail seen with more difficulty than last night. The second branch is not separated from the coma which extends excentrically a considerable distance from the nucleus: the tail properly so called, is connected only on the northern side of the coma. Position-angle of the tail 305°. Nucleus as conspicuous as a 5th magnitude star.

Date, 1877.	Oxford Mean Time of Observation.	R.A. of Comet — R.A. of Star.	No. of Com- pari- sons.	N.P.D. of Comet — N.P.D. of Star.	No. of Com- pari- sons.	Micro- meter used.	Log. factor of Parallax in R.A.	Log. factor of Parallax in N.P.D.
	h. m. s.	m. s.		" "				
May 4†	11 42 54.6	— 1 43.48	5	+ 6 23.1	5	G	— 8.8722	— 9.8474
5	8 38 59.3	...	...	— 1 1.2	6	F	...	— 9.9385
5	8 47 15.1	+ 17.06	6	...	...	F	— 7.0964	...
5†	9 24 29.0	+ 34.69	7	— 5 15.9	7	G	— 8.3142	— 9.9328
7†	8 59 40.9	+ 2 19.45	8	+ 54.8	8	G	+ 7.2381	— 9.9191
7	9 40 27.4	+ 2 48.53	6	— 2 16.6	6	F	— 8.3535	— 9.9145
8	10 3 8.1	— 7 7.86	5	— 1 30.0	5	G	— 8.4781	— 9.9026
8	10 5 40.7	— 7 56.25	4	— 49.5	4	G	— 8.5016	— 9.9015
15	9 42 42.7	+ 14 12.50	2	— 6 36.3	2	G	+ 9.2837	— 9.6886
15	9 57 36.7	— 14 15.00	1	— 5 5.5	1	G	+ 9.2625	— 9.7143
17	9 20 23.3	— 49.97	6	+ 3 0.2	5	F	+ 9.2953	— 9.4644
17†	9 46 9.7	— 17.62	6	+ 4 22.8	6	G	+ 9.2809	— 9.5507
24	9 50 59.7	— 4 21.85	2	— 1 16.0	2	G	+ 9.0624	— 9.4219
24	10 6 34.3	— 1 54.07	6	+ 8 32.9	6	G	+ 9.0609	— 9.4730
24†	10 24 59.9	— 1 48.38	6	+ 9 46.9	6	G	+ 9.0592	— 9.5358
26	9 43 38.9	+ 1 16.61	7	+ 6 38.1	7	G	+ 9.0120	— 9.4107
26	9 43 38.9	— 34.54	7	— 4 39.6	7	G	+ 9.0120	— 9.4107
26	10 14 35.2	— 27.77	6	— 3 4.8	6	F	+ 9.0127	— 9.5257
28	9 51 53.0	+ 2 11.69	7	— 4 49.0	7	G	+ 8.9718	— 9.5870
28	9 51 53.0	+ 1 28.19	7	— 4 10.8	7	G	+ 8.9718	— 9.5870
28	10 28 42.1	+ 2 19.72	5	— 2 58.7	5	F	+ 8.9710	— 9.5942
28	10 28 42.1	+ 1 36.16	5	— 2 20.1	5	F	+ 8.9710	— 9.5942
29	9 33 21.7	+ 3 17.55	6	+ 35.2	6	G	+ 8.9498	— 9.4340
30	9 34 27.9	— 1 49.06	5	+ 4 42.4	5	F	+ 8.9339	— 9.4576
30†	9 56 28.5	— 1 46.38	5	+ 5 49.3	5	G	+ 8.9372	— 9.5308
June 3	10 3 22.0	— 4 29.92	5	+ 7 27.5	5	F	+ 8.8831	— 9.6169
3	10 3 22.0	— 5 4.44	5	+ 9 28.9	5	F	+ 8.8831	— 9.6169
4	10 42 3.8	+ 4 54.22	5	— 2 37.7	5	G	+ 8.8657	— 9.7143
5	10 17 16.0	+ 46.90	7	— 4 29.5	7	G	+ 8.8595	— 9.6751
5†	10 40 56.7	+ 49.00	6	— 3 28.5	6	G	+ 8.8551	— 9.7226

May 5. The general appearance as last night. Tail traceable 2°.

May 7. The tail not well seen, but traceable with difficulty about 14'. The Position-angle 310°. The diameter of the envelope 6'.

May 8. The observation made in a generally cloudy sky. Observations of form or change impossible. The place very insecure.

May 15. The tail insignificant. The diameter of coma 8' to 9'.

May 17. The Position-angle of the tail 45°. The comet has still a very nearly stellar nucleus, equal in brilliancy to a 7th magnitude star. Diameter of the coma estimated at 6'.

May 24. Observed in bright moonlight. The prominent feature is the distinct nucleus: the coma is elliptical in shape, the greatest diameter being nearly in the parallel of declination, and perhaps extending to 8' from the nucleus.

Assumed R.A. of Comparison Star, 1877.0.	Assumed N.P.D. of Com- parison Star, 1877.0.	Authority for Star's Place.	Ap-arent R.A. of Comet.	Apparent N.P.D. of Comet.
h. m. s. * ... 23 36 12.97 ... o 2 24.93	o    "    " * 22 0 34.7 ... ... 17 51 25.3	Fedorenko, No. 4547. "    " "    " Oeltzen Argelander, No. 16.	h. m. s. * ... 23 36 27.81 23 36 45.44 o 4 41.27	...    "    " * 21 59 42.2 ... 21 55 27.8 17 52 26.9
o 2 24.93 * * 4 43 44.72 5 12 44.28	17 51 25.3 * * 10 16 33.7 10 15 21.0	Oeltzen Argelander, No. 16. Oeltzen Argelander, No. 5182. "    "    No. 5706.	o 5 10.35 * * 4 57 53.82 4 58 26.63	17 49 15.5 * * 10 9 45.7 10 9 59.2
6 14 3.32 ... * 8 12 5.05 ...	11 45 36.5 ... * 20 51 41.0 ...	Radeliffe First Catalogue, No. 1701. "    "    " +69°, No. 465, Bonn Obs. vol. vi. "    "    "	6 13 12.67 6 13 45.02 * 8 10 12.83 8 10 18.52	11 48 18.9 11 49 41.5 * 20 59 57.9 21 1 11.9
8 23 2.70 8 24 54.31 ... 8 33 7.84 8 33 50.96	23 29 19.4 23 40 34.5 ... 26 10 46.0 26 10 8.9	+66°, No. 557, Bonn Obs. vol. vi. Oeltzen Argelander, No. 9077. "    "    " Oeltzen Argelander, No. 9195. "    "    No. 9209.	8 24 21.10 8 24 21.58 8 24 28.37 8 35 21.34 8 35 20.96	23 35 42.8 23 35 40.2 23 37 15.0 26 5 43.1 26 5 44.3
8 33 7.84 8 33 50.96 8 36 34.39 8 45 47.85 ...	26 10 46.0 26 10 8.9 27 16 34.0 28 21 48.5 ...	Oeltzen Argelander, No. 9195. "    "    No. 9209. Rümker, No. 2619, and O.A. No. 9257. Oeltzen Argelander, No. 9383. "    "    "	8 35 29.37 8 35 28.93 8 39 53.76 8 44 0.66 8 44 3.33	26 7 33.5 26 7 35.0 27 16 55.7 28 26 18.0 28 27 25.0
* * 8 54 52.77 9 1 24.85 ...	* * 33 50 22.5 34 48 57.0 ...	+56°, No. 1357, Bonn Obs. vol. vi. Rümker, No. 2753. "    "	* * 8 59 48.74 9 2 13.50 9 2 15.61	* * 33 47 33.6 34 44 16.7 34 45 17.3

May 26. With a full moon in the sky the comet appeared as a nearly circular nebula of about  $1\frac{1}{2}'$  diameter, with an excentric nucleus of not more than  $2''$  in diameter in the n.f. quadrant.

May 28. Appearance the same as on the 26th inst., but the nebulosity traced to a greater distance.

May 29. Stellar appearance not so noticeable : sky generally cloudy.

May 30. No change in appearance. Atmospheric conditions same as yesterday.

June 3. The sky was very clear, and the comet conspicuous. The nucleus had a diameter of  $4''$ , surrounded by rather brilliant coma to a distance of  $4'$  or  $5'$ . The nebulosity was thought to be traced from the nucleus, in a direction n.f. to a distance of  $20'$  to  $25'$ .

June 4. Cirrus clouds. The comet often invisible.

June 5. The nucleus appeared as a 9th mag. star, ill-defined. Difficult to trace the nebulosity.

Date, 1877.	Oxford Mean Time of Observation.	R.A. of Comet — R.A. of Star.	No. of Com- pari- sons.	N.P.D. of Comet — N.P.D. of Star.	No. of Com- pari- sons.	Micro- meter used.	Log. factor of Parallax in R.A.	Log. factor of Parallax in N.P.D.
	h. m. s.	m. s.		' "				
June 5	10 59 2.5	+ 51.93	6	— 2 55.0	6	F	+ 8.8480	— 9.7531
6	10 30 4.7	— 2 48.85	6	+ 12 34.1	6	F	+ 8.8473	— 9.7130
6†	10 50 11.3	— 2 47.24	5	+ 13 22.6	5	G	+ 8.8409	— 9.7481
8	11 3 55.8	— 1 28.75	2	— 1 30.8	2	G	+ 8.8142	— 9.7878
8	11 26 12.0	— 4 1.05	6	— 1 59.1	6	G	+ 8.7994	— 9.8189
9	10 39 57.9	— 1 35.59	7	+ 5 42.1	7	F	+ 8.8165	— 9.7592
9	11 9 41.2	— 1 33.57	6	+ 6 37.7	6	G	+ 8.8015	— 9.8035
10	10 18 16.0	— 3 59.37	6	— 4 13.2	6	G	+ 8.8141	— 9.7352
14†	10 49 21.8	+ 1 48.28	6	+ 3 12.4	6	G	+ 8.7720	— 9.8141
14	11 13 24.8	+ 1 50.87	6	+ 4 0.6	6	F	+ 8.7556	— 9.8427
15	10 19 58.0	— 2 15.97	6	— 10 28.9	6	G	+ 8.7779	— 9.7825
15	10 34 23.0	— 1 50.17	4	+ 16 25.0	4	G	+ 8.7714	— 9.8013
15†	10 46 37.5	— 2 14.04	5	— 9 45.4	5	G	+ 8.7662	— 9.8176
16†	10 36 25.3	+ 1 49.32	5	— 7 57.2	5	G	+ 8.7649	— 9.8114
16	11 2 13.0	— 3 53.65	5	+ 4 32.0	6	F	+ 8.7492	— 9.8425
17	10 37 35.1	— 2 37.96	5	— 1 17.9	5	F	+ 8.7577	— 9.8199
17	10 37 35.1	— 3 3.56	5	+ 4 52.8	5	F	+ 8.7577	— 9.8199
19	10 40 52.9	— 4 15.50	6	— 1 4.7	6	G	+ 8.7428	— 9.8370
20	10 39 29.8	+ 20.68	6	+ 34.4	6	G	+ 8.7378	— 9.8406
20	10 39 29.8	— 12.52	6	+ 4 42.1	6	G	+ 8.7378	— 9.8406
25	10 48 45.4	— 3 47.95	2	— 2 51.3	2	F	+ 8.7019	— 9.8759
25	10 58 45.7	— 1 30.85	6	+ 2 48.6	6	G	+ 8.6937	— 9.8842
26	11 14 6.8	+ 5.27	6	+ 8 49.8	6	G	+ 8.6710	— 9.9022
July 2	10 48 30.1	+ 59.45	6	+ 5 6.3	6		+ 8.6605	— 9.9038

June 6. The greatest diameter of the entire nebulosity not more than 5'.

June 8. The stellar character of the nucleus is disappearing, but the condensation is sufficiently well-marked. The greatest diameter apparently 7' or 8'.

June 9. More faint and blurred than it has hitherto been seen, but still visible in the telescope of 2 inches aperture attached to the large refractor.

June 10. No change. Diameter estimated 6'.

June 14. The comet has no defined shape, and is rapidly diminishing in brilliancy. Not seen in the telescope of 2 inches aperture.

June 15. The comet's decrease in brilliancy steady and marked. The strong condensation, equivalent to a 10th magnitude star, however, makes the observation tolerably easy and secure.

June 16. As last night.



Assumed R.A. of Comparison Star, 1877.0.	Assumed N.P.D. of Com- parison Star, 1877.0.	Authority for Star's Place.	Apparent R.A. of Comet.	Apparent N.P.D. of Comet.
h. m. s.	" " "		h. m. s.	" " "
9 1 24.85	34 48 57.0	Rümker, No. 2753.	9 2 18.54	34 45 50.8
9 7 19.63	35 28 19.1	{Greenwich 7-Year Cat. 1860, No. 705. Radcliffe First Catalogue, No. 2293.}	9 4 32.57	35 40 43.2
...	...		9 4 34.16	35 41 31.8
9 10 11.23	37 30 28.4	Ast. Nachrichten, No. 2144, col. 127.	9 8 44 25	37 28 47.9
9 12 45.97	37 31 45.9	Oeltzen Argelander, No. 9796.	9 8 46.61	37 29 37.3
9 12 11.00	38 13 18.2	{Greenwich 7-Year Cat. 1864, No. 1143. Radcliffe Second Catalogue, No. 939.}	9 10 37.14	38 18 50.7
...	...		9 10 39.16	38 19 46.2
9 16 20.20	39 11 44.0	Rad. 1st Cat. 2322; Wash. Cat. No. 3909.	9 12 22.55	39 7 21.8
9 16 57.06	42 8 27.2	Oeltzen Argelander, No. 9852.	9 18 46 98	42 11 31.8
...	...	" "	9 18 49.57	42 12 20.0
9 22 26.29	43 3 45.5	New Bonn Zones, Ast. Nach. 2165, c. 75.	9 20 11.96	42 53 8.8
9 22 0.70	42 37 35.8	Oeltzen Argelander, No. 9942.	9 20 12.19	42 53 33.2
9 22 26.29	43 3 45.5	New Bonn Zones, Ast. Nach. 2165, c. 75.	9 20 13.89	42 53 52.4
9 19 44.88	43 42 52.8	Oeltzen Argelander, No. 9918.	9 21 35.81	43 34 48.3
9 25 29.11	43 31 16.2	+ 46°, No. 1523, Bonn Obs. vol. vi.	9 21 37.12	43 35 40.6
9 25 32.36	44 16 20.8	+ 45°, No. 1733, Bonn Obs. vol. vi.	9 22 56.03	44 14 54.2
9 25 58.41	44 10 8.7	Rad. 1st Cat. No. 2361, & O.A. No. 10002.	9 22 56.49	44 14 55.9
9 29 41.19	45 33 5.7	Weisse Bessel II, No. 590.	9 25 27.29	45 31 54.5
9 26 17.43	46 8 3.7	" Nos. 513-4.	9 26 39.70	46 8 31.7
9 26 50.93	46 4 0.4	+ 44°, No. 1878, Bonn Obs. vol. vi.	9 26 40.00	46 8 36.6
9 35 58.33	49 2 3.4	Weisse Bessel II, No. 745.	9 32 12.83	48 59 7.5
9 33 43.09	48 56 43.9	" No. 684.	9 32 13.78	48 59 27.0
9 33 9.55	49 22 24.1	" Nos. 675-6.	9 33 16.31	49 31 10.5
*	*		*	*

June 17. Still seen in the telescope of 4 inches aperture, but with difficulty. The diameter of the entire nebosity did not appear to be more than 4'.

June 19. Comet very small, and on account of the moonlight and the light sky, appeared more stellar than lately. Not seen in the telescope of 4 inches aperture, but sky somewhat hazy.

June 20. Sky cloudy. The comet seen with great difficulty. Observation uncertain.

June 25. Comet very faint and small, but has still noticeable condensation.

June 26. Same as last night. Barely visible.

July 2. Observed over wires placed at an angle of 45° with meridian. An accident having occurred which prevented the usual gridiron-micrometer being employed. The comet was round and condensed, but the diameter of the whole nebosity did not appear to be more than 30" or 40".

Clouds prevented further observation till July 6, on which evening the comet was looked for without success.

Date 1877.	Oxford Mean Time of Observation.	R.A. of Comet — R.A. of Star.	No. of Com- pari- sons.	N.P.D. of Comet — N.P.D. of Star.	No. of Com- pari- sons.	Micro- meter used.	Log. factor of Parallax in R.A.	Log. factor of Parallax in N.P.D.
	h. m. s.	m. s.		"				
Apr. 16	9 59 41.9	— 5 46.10	2	— 7 42.4	2	G	+ 8.5109	— 9.9529
16	10 19 16.0	— 1 40.06	5	+ 20.6	5	G	+ 8.4260	— 9.9616
16†	10 42 51.1	— 1 32.57	4	— 23.4	4	G	+ 8.2514	— 9.9697
19	10 20 58.3	+ 23.31	7	+ 2 39.3	7	F	+ 8.5168	— 9.9490
19†	10 41 17.5	+ 32.67	6	+ 2 6.3	6	G	+ 8.4220	— 9.9574
19†	12 13 10.0	+ 1 10.50	5	— 40.5	5	G	— 7.6707	— 9.9713
21	11 25 23.0	— 1 17.90	5	+ 4 14.2	5	F	+ 8.2252	— 9.9631
22†	14 44 9.2	+ 1 38.83	6	— 6.9	6	G	— 8.6850	— 9.9171
22†	14 45 17.1	+ 22.38	5	— 26.4	5	G	— 8.6837	— 9.9164
23	10 52 39.3	— 5 22.08	5	+ 6 11.6	5	F	+ 8.5326	— 9.9439
24	9 15 23.4	— 1 51.22	4	— 4 6.1	4	G	+ 8.8133	— 9.8632
24	9 21 35.0	+ 2 4 10	2	+ 8 50.5	2	G	+ 8.7978	— 9.8719
26	10 33 52.1	— 1 29.00	6	+ 39.9	6	G	+ 8.7009	— 9.9122
May 3	10 44 23.2	+ 2 7.09	7	— 1 1.9	7	F	+ 8.8029	— 9.8684
4	10 4 54.6	— 1 7 81	7	+ 1 5.4	7	F	+ 8.8619	— 9.8118
4†	10 29 45.8	— 53.93	6	+ 1 48.8	6	G	+ 8.8325	— 9.8438
5	10 21 6.8	+ 1 53.65	6	+ 2 10.7	6	F	+ 8.8461	— 9.7579
5†	10 33 8.0	+ 2 3.34	5	+ 2 34.4	5	G	+ 8.8321	— 9.7788
7	10 31 56.9	— 28.87	8	+ 12.4	7	F	+ 8.8360	— 9.8271
7†	10 45 2.8	— 22.60	6	+ 25.4	6	G	+ 8.8208	— 9.8439
15	10 34 0.3	+ 11 35	8	+ 55.2	8	F	+ 8.7964	— 9.8112
15†	10 55 40.9	+ 17.72	7	+ 1 41.1	6	G	+ 8.7807	— 9.8375
15†	10 55 40.9	— 1 47.32	7	+ 3 58.1	6	G	+ 8.7807	— 9.8375
17†	10 25 35.6	— 4 57.83	3	+ 5 48.2	2	G	+ 8.7869	— 9.8025
17	11 8 52.0	— 4 43.30	5	+ 7 46.5	5	F	+ 8.7554	— 9.8557
29	10 48 15.2	0.00	...	+ 2 57.5	...	G	+ 8.6932	— 9.8674
30	11 0 35.3	+ 3 55.77	6	+ 0 31.6	6	F	+ 8.6792	— 9.8816
June 4	11 20 55.0	— 1 53.90	3	+ 0 46.8	3	G	+ 8.6355	— 9.8974

April 16. The comet seen for the first time to-night, is about 2' in diameter, of sufficient brightness to be visible in the 2-inch telescope, but the condensation is not at all strongly marked.

April 19. Diameter of entire nebosity 3' to 4'. No nucleus, but strong condensation towards the centre.

April 21. The comet very faint from light haze and moonlight. Seen only by averted vision.

April 22. The comet found with difficulty and observation not very good.

April 23. The nebosity is not circular but slightly elliptical: the greatest condensation is on the n. f. side. Greatest diameter 4'. Visible in the telescope of 4 inches, but not in that of 2 inches aperture.

April 24. Strong moonlight. The observation is of the centre of a very faint nebulous patch of light.

April 26. Full moon. The comet very difficult to see.

May 3. The diameter about 2½'. Slight condensation in the centre, which very gradually diminishes towards the periphery.

Assumed R.A. of Comparison Star, 1877.0.	Assumed N.P.D. of Com- parison Star, 1877.0.	Authority for Star's Place.	Apparent R.A. of Comet.	Apparent N.P.D. of Comet.
h. m. s.	° ' "		h. m. s.	° ' "
1 28 54.90	33 35 31.7	Rümker, No. 340.	1 23 7.21	33 27 44.5
1 24 55.81	33 26 29.5	" No. 316.	1 23 14.13	33 26 45.7
...	...	" "	1 23 21.62	33 26 1.7
1 51 21.73	31 26 11.6	Oeltzen Argelander, No. 2200.	1 51 43.40	31 28 50.6
...	...	" " "	1 51 52.76	31 28 17.9
1 51 21.73	31 26 11.6	Oeltzen Argelander, No. 2200.	1 52 30.59	31 25 31.1
*	*		*	*
*	*		*	*
*	*		*	*
2 42 5.23	29 21 55.4	+ 60°, No. 581, Bonn Obs. vol. vi.	2 36 41.66	29 27 57.0
2 50 3.79	29 12 14.5	Oeltzen Argelander, No. 3324.	2 48 11.13	29 7 58.2
2 46 12.69	28 58 58.8	+ 60°, No. 591, Bonn Obs. vol. vi.	2 48 15.32	29 7 39.2
*	*		*	*
4 46 17.30	29 27 8.0	+ 60°, No. 848, Bonn Obs. vol. vi.	4 48 24.03	29 25 50.8
5 1 58.78	29 50 48.6	Oeltzen Argelander, No. 5560.	5 0 51.05	29 51 38.4
5 1 58.78	29 50 48.6	Oeltzen Argelander, No. 5560.	5 1 4.93	29 52 21.7
5 11 32.37	30 21 15.0	+ 59°, No. 871, Bonn Obs. vol. vi.	5 13 25.94	30 23 10.3
...	...	" " "	5 13 35.63	30 23 34.0
5 37 35.12	31 37 48.6	+ 58°, No. 859, Bonn Obs. vol. vi.	5 37 6.47	31 37 45.2
...	...	" " "	5 37 12.74	31 37 58.2
6 52 20.81	38 34 29.0	Oeltzen Argelander, No. 7449.	6 52 33.08	38 35 10.2
...	...	" " "	6 52 39.45	38 35 56.1
6 54 26.41	38 32 17.0	" " No. 7479.	6 52 40.03	38 36 0.8
7 11 51.83	40 31 33.8	+ 40°, No. 1618, Bonn Obs. vol. vi.	7 6 55.07	40 37 8.2
...	...	" " "	7 7 9.10	40 39 6.4
8 8 37.87	53 1 40.3	+ 37°, No. 1844, Bonn Obs. vol. vi.	8 8 39.30	53 4 29.9
8 8 28.94	54 4 26.6	W.B. II, No. 132; Rad. 1874, No. 469.	8 12 26.15	54 4 50.2
8 31 3.28	58 51 32.4	Leiden Obs. vol. iv, Zone 13, No. 30.	8 29 10.65	58 52 13.3

May 4. The comet rather fainter than last night. Form, elliptical: greatest diameter 3' to 4'.  
Brightest part of the condensation in the n.f. quadrant.

May 5. The comet fainter but still tolerably conspicuous. Diameter 4'.

May 7. Very diffused with little condensation: just visible in the telescope of 4 inches aperture, but the sky not very clear.

May 15. A faint nebulous patch of light, with very little condensation, and about 1' in diameter.

May 17. Still seen, but with difficulty in the telescope of 4" aperture. No alteration in form or character since the 15th inst.

May 29. The comet is 60" or 70" in diameter, but with no condensation. Very difficult to see.

May 30. The comet seen rather better than last night. It has the appearance of a round nebula, without condensation or detail. Diameter about 50" or 70".

June 4. Observed between passing clouds. The place is uncertain. The comet was looked for on June 5 and 6 unsuccessfully.



*Observations of Comet (e), (Coggia)*

Date, 1877.	Oxford Mean Time of Observation.	R.A. of Comet — R.A. of Star.	No. of Com- pari- sons.	N.P.D. of Comet — N.P.D. of Star.	No. of Com- pari- sons.	Micro- meter used.	Log. factor of Parallax in R.A.	Log. factor of Parallax in N.P.D.
	h. m. s.	m. s.		" "				
Sept. 18	12 1 16.0	— 1 0.12	4	— 9 24.2	4	...	— 8.7252	— 9.8780
Oct. 15	11 53 48.6	— 58.94	5	+ 2 32.6	5	G	— 8.7184	— 9.8098
29	11 48 53.3	+ 19.84	5	+ 7 25.5	5	G	— 8.6540	— 9.7665
31	11 7 59.1	+ 8.66	7	+ 7 26.3	7	G	— 8.6611	— 9.7959
31†	11 15 48.9	+ 7.02	5	+ 7 49.3	5	G	— 8.6576	— 9.7895
Nov. 1	10 43 25.1	+ 51.27	6	+ 2 45.5	6	G	— 8.6639	— 9.8151
9	11 23 16.8	— 1 2.70	2	+ 14 25.5	2	G	— 8.5569	— 9.7870
9	11 34 29.2	— 49.58	5	+ 2 53.1	3	G	— 8.5419	— 9.7958
10	10 46 1.2	+ 2.94	7	+ 3 14.0	7	G	— 8.5896	— 9.8094
27	11 44 44.8	+ 0.44	4	+ 3 26.8	6	F	— 7.8561	— 9.8937
29	10 53 44.5	+ 1 10.14	5	+ 2 12.1	5	F	— 8.1178	— 9.9048
Dec. 1	10 8 7.6	— 1 3.78	4	— 6 8.2	4	G	— 8.2226	— 9.9142
6	10 3 24.4	+ 50.40	6	— 7 8.7	6	G	— 8.0849	— 9.9342
7	10 33 3.7	+ 49.60	6	+ 7 58.6	6	G	— 7.7377	— 9.9390

Sept. 18. The observation was made by means of transits over a pair of wires inclined at  $45^{\circ}$  to the meridian: the 'gridiron' micrometer not being returned from the optician. The comet seemed to be only a few seconds in diameter, and was very faint.

Oct. 15. The comet appeared as a faint patch of light of about 100" diameter: round.

Oct. 29. Further comparisons prevented by the rising of the moon, which effectually concealed the comet. Sensibly circular: perhaps 2' in diameter.

Oct. 31. Comet indistinct. No detail.

Nov. 1. Seen rather more distinctly than on the 29th or 31st ult. Slightly elliptical in shape with very slight condensation. Diameter 80" to 100".

Nov. 9. Seen with great difficulty, and the sky often covered with clouds. Diameter estimated at 50".

*Observations of Comet (f), (Tempel)*

	h. m. s.	m. s.		" "				
Oct. 5	9 9 43.6	— 18.35	6	+ 8 48.6	6	F	— 8.2188	— 9.9514
8	9 37 32.8	— 5 31.78	5	+ 13 34.1	5	F	— 8.9001	— 9.9646
8	9 37 32.8	— 6 1.72	5	+ 14 40.2	5	F	— 8.9001	— 9.9646
9	11 9 14.7	+ 15.68	5	+ 8.2	5	F	+ 8.8215	— 9.9665

Oct. 5. Comet easily found, being tolerably bright. The form is indistinct, although there is some indication of a tail, but none of a decided nucleus.

Assumed R.A. of Comparison Star, 1877.0.	Assumed N.P.D. of Com- parison Star, 1877.0.	Authority for Star's Place.	Apparent R.A. of Comet	Apparent N.P.D. of Comet.
h. m. s.	° ' "		h. m. s.	° ' "
8 30 12.59	43 0 36.8	+ 47°, No. 1600, Bonn Obs. vol. vi.	8 29 15.73	42 51 3.7
*	*		*	*
7 9 13.72	60 13 50.0	Weisse Bessel II, No. 236.	7 9 37.94	60 21 16.9
6 59 40.98	61 38 3.0	" " No. 1770.	6 59 53.95	61 45 29.2
...	...	" " "	6 59 52.31	61 45 52.2
6 55 4.34	62 30 4.9	Microm. connected with W.B. II, 1578.	6 56 0.09	62 32 49.6
6 21 39.56	69 42 42.1	ν Gemin. Gr. 7-Year Cat. 1864, No. 825.	6 20 41.47	69 57 2.2
6 21 23.17	69 54 24.0	+ 20°, No. 1437, Bonn Obs. vol. vi.	6 20 38.20	69 57 11.1
*	*		*	*
4 52 18.88	90 3 32.3	Weisse Bessel I, No. 1123.	4 52 23.56	90 6 42.8
4 42 10.64	92 5 6.8	Weisse Bessel I, No. 879.	4 43 25.41	92 7 1.6
4 27 28.12	94 14 25.8	Bonn Obs. vol. vi, Appendix.	4 26 28.96	94 8 0.1
4 13 34.99	98 25 6.8	Weisse Bessel I, No. 241.	4 14 29.97	98 17 39.9
4 9 47.54	98 56 38.6	" " No. 165.	4 10 41.70	99 4 21.1

Nov. 10. No change since last night. No distinct nucleus.

Nov. 27. Blurred and faint: without nucleus, and very little condensation. The place very doubtful.

Nov. 29. Seen rather more distinctly, but the place is not very good.

Dec. 1. Seen with great difficulty: sky somewhat hazy, and definition of stars very bad.

Dec. 6. Very faint, but exhibits no change of character. The diameter of the whole nebulosity 50".

Dec. 7. The comet is very indistinct. The observation is believed to apply to the centre of the nebulosity: no condensation being noticeable. No further opportunity occurred of looking for the comet till Dec. 12, when the moonlight was too strong.

at the Oxford University Observatory, 1877.

h. m. s.	° ' "		h. m. s.	° ' "
23 40 13.39	103 26 17.4	Microm. connected with W.B. I, No. 740.	23 39 59.27	103 34 42.4
23 35 35.65	106 8 41.2	Oeltzen Argelander, No. 23001.	23 30 8.14	106 21 52.9
23 36 5.53	106 7 40.1	" " No. 23004.	23 30 8.10	106 21 58.0
23 26 38.08	107 14 55.1	Micr. connected with O.A. No. 22905.	23 26 58.03	107 14 41.0

Oct. 8. The sky not good, and the object indistinct and blurred. No tail seen.

Oct. 9. Seen only in glimpses. Sky misty.

# PROVISIONAL ELEMENTS OF THE FIVE PARABOLIC COMETS COMPUTED AT OXFORD IN 1877.

## COMET (a) BORRELLY.

$T$	1877, Jan. 19, 2210 G.M.T.
$\pi$	200° 4' 15"
$\Omega$	187 18 4
$i$	27 0 9
Log. $q$	9.90713
Motion	Retrograde.

Obtained from one observation made at Marseilles on Feb. 9 combined with two others made at Oxford, Feb. 20 and 28.

## COMET (b) WINNECKE.

$T$	1877, April 17, 63942 G.M.T.
$\pi$	253° 30' 2".1
$\Omega$	316 35 36.3
$i$	58 53 36.3
Log. $q$	9.9777642
Motion	Retrograde.

Obtained from three observations made at Oxford on April 7, 22, and May 4. From these elements the ephemeris, given on the opposite page, has been computed, and with it, the observations given in this section have been compared. The results are found on pp. 59, 60.

## COMET (c) SWIFT.

$T$	1877, April 26, 81559 G.M.T.
$\pi$	102° 46' 5".1
$\Omega$	345 59 18.3
$i$	77 10 29.3
Log. $q$	0.0042458
Motion	Direct.

Obtained from an observation made at Marseilles on April 14 combined with two others made at Oxford on April 24 and May 3.

## COMET (e) COGGIA.

$T$	1877, Sept. 11, 40830 G.M.T.
$\pi$	107° 37' 41".2
$\Omega$	250 58 48.9
$i$	77 42 26.9
Log. $q$	0.1977141
Motion	Retrograde.

Obtained from two observations made at Oxford on Sept. 18 and Oct. 31 combined with one made at Strasburg on Oct. 6.

## COMET (f) TEMPEL.

$T$	1877, June 30, 3572 G.M.T.
$\pi$	89 12' 21"
$\Omega$	184 15 51
$i$	66 42 40
Log. $q$	9.961525
Motion	Retrograde.

Obtained from an observation made at Milan on Oct. 2 combined with two made at Oxford on Oct. 5 and 8.

All longitudes are reckoned from the Mean Equinox of the beginning of the year.

Date, 1877.	Geocentric R.A.	Geocentric N.P.D.	Log. Dist from Earth.	Date, 1877.	Geocentric R.A.	Geocentric N.P.D.	Log. Dist. from Earth.
	° ' "	° ' "			° ' "	° ' "	
April 5.5	331 55 57.3	75 14 32.6	0.15363	April 30.0	343 46 46.0	33 44 37.4	
6.5	332 7 13.0	74 5 30.2		30.25	344 6 10.2	33 11 28.3	
7.5	332 19 2.8	72 54 12.2		30.5	344 26 13.2	32 38 16.7	
8.5	332 31 30.1	71 40 28.9		30.75	344 46 56.8	32 5 3.3	
9.5	332 44 38.6	70 24 14.6	0.12462	May 1.0	345 8 22.8	31 31 48.5	
10.5	332 58 32.2	69 5 24.8		1.25	345 30 33.6	30 58 33.0	
11.5	333 13 15.3	67 43 53.1		1.5	345 53 31.8	30 25 17.3	
12.5	333 28 53.0	66 19 34.4		1.75	346 17 19.8	29 52 1.9	
13.5	333 45 30.8	64 52 23.6	0.09511	2.0	346 42 0.0	29 18 47.4	
14.5	334 3 14.8	63 22 15.7		2.25	347 7 34.4	28 45 34.5	
15.5	334 22 12.2	61 49 6.2		2.5	347 34 6.4	28 12 23.7	
16.5	334 42 31.1	60 12 51.4		2.75	348 1 39.7	27 39 15.8	
17.5	335 4 20.6	58 33 28.4	0.06620	3.0	348 30 17.5	27 6 11.4	
18.5	335 27 51.1	56 50 55.3		3.25	349 0 3.1	26 33 11.3	
19.5	335 53 14.5	55 5 11.2		3.5	349 31 0.4	26 0 16.1	9.99479
20.0	336 6 42.9	54 11 7.6		3.75	350 3 13.5	25 27 26.7	
20.5	336 20 44.9	53 16 16.6		4.0	350 36 46.6	24 54 43.9	
21.0	336 35 22.6	52 20 38.4		4.25	351 11 44.8	24 22 8.7	
21.5	336 50 38.5	51 24 13.6	0.03955	4.5	351 48 13.2	23 49 41.8	
22.0	337 6 34.9	50 27 2.7		4.75	352 26 16.8	23 17 24.1	
22.5	337 23 14.5	49 29 6.3		5.0	353 6 1.8	22 45 16.7	
23.0	337 40 40.2	48 30 25.1		5.25	353 47 34.4	22 13 20.7	
23.5	337 58 54.8	47 31 0.4		5.5	354 31 0.5	21 41 36.9	9.99502
24.0	338 18 2.3	46 30 53.1		5.75	355 16 27.3	21 10 6.5	
24.5	338 38 6.2	45 30 4.6		6.0	356 4 3.7	20 38 50.4	
25.0	338 59 10.9	44 28 35.9		6.25	356 53 57.5	20 7 50.5	
25.5	339 21 20.7	43 26 28.9	0.01724	6.5	357 46 17.3	19 37 7.9	9.99606
26.0	339 44 40.9	42 23 45.4		6.75	358 41 12.7	19 6 43.9	
26.5	340 9 16.8	41 20 27.2		7.0	359 38 53.7	18 36 40.3	
27.0	340 35 13.9	40 16 36.5		7.25	0 39 31.2	18 6 58.7	
27.5	341 2 39.2	39 12 15.7		7.5	1 43 16.7	17 37 40.6	9.99771
27.75	341 16 56.6	38 39 55.0		7.75	2 50 22.5	17 8 48.1	
28.0	341 31 38.8	38 7 27.8		8.0	4 1 1.4	16 40 23.2	
28.25	341 46 47.2	37 34 54.2		8.25	5 15 27.0	16 12 27.8	
28.5	342 2 23.2	37 2 14.6		8.5	6 33 53.6	15 45 4.1	9.99996
28.75	342 18 28.2	36 29 30.1		8.75	7 56 36.6	15 18 14.4	
29.0	342 35 3.3	35 56 40.1		9.0	9 23 51.3	14 52 1.5	
29.25	342 52 9.3	35 23 45.3		9.25	10 55 52.9	14 26 28.1	
29.5	343 9 47.2	34 50 46.4	0.00165	9.5	12 32 57.7	14 1 37.7	0.00278
29.75	343 27 58.8	34 17 43.5		9.75	14 15 21.4	13 37 33.2	

Date, 1877.	Geocentric R.A.	Geocentric N.P.D.	Log. Dist. from Earth.	Date, 1877.	Geocentric R.A.	Geocentric N.P.D.	Log. Dist. from Earth.
May 10.0	16 3 19.7	13 14 18.0		May 20.0	108 57 15.1	14 59 31.0	
10.25	17 57 6.9	12 51 55.9		20.25	110 3 20.0	15 19 30.2	
10.5	19 56 56.0	12 30 31.0	0.00616	20.5	111 6 10.9	15 39 37.9	0.06293
10.75	22 2 58.1	12 10 6.7		20.75	112 5 59.5	15 59 52.2	
11.0	24 15 21.6	11 50 47.5		21.0	113 2 57.1	16 20 12.0	
11.25	26 34 11.0	11 32 37.3		21.25	113 57 14.1	16 40 35.9	
11.5	28 59 27.1	11 15 41.0	0.01005	21.5	114 49 0.5	17 1 2.5	0.07014
11.75	31 31 3.4	11 0 2.9		21.75	115 38 25.5	17 21 30.8	
12.0	34 8 49.1	10 45 47.1		22.0	116 25 37.4	17 42 0.1	
12.25	36 52 24.5	10 32 57.7		22.25	117 10 44.4	18 2 29.7	
12.5	39 41 24.6	10 21 38.8	0.01443	22.5	117 53 54.4	18 22 58.7	0.07750
12.75	42 35 13.4	10 11 53.8		22.75	118 35 13.9	18 43 26.0	
13.0	45 33 9.9	10 3 45.4		23.0	119 14 49.4	19 3 51.1	
13.25	48 34 24.4	9 57 16.2		23.25	119 52 47.2	19 24 13.6	
13.5	51 38 1.0	9 52 27.4	0.01928	23.5	120 29 12.9	19 44 32.9	
13.75	54 42 59.8	9 49 19.9		23.75	121 4 11.6	20 4 48.2	
14.0	57 48 17.8	9 47 53.6		24.0	121 37 48.2	20 24 59.3	
14.25	60 52 51.5	9 48 7.2		24.25	122 10 7.4	20 45 5.7	
14.5	63 55 38.5	9 49 59.0	0.02454	24.5	122 41 13.2	21 5 7.2	0.09255
14.75	66 55 40.3	9 53 26.1		24.75	123 11 9.8	21 25 3.5	
15.0	69 52 3.9	9 58 25.1		25.0	123 40 0.9	21 44 53.9	
15.25	72 44 2.9	10 4 51.9		25.25	124 7 50.1	22 4 38.5	
15.5	75 30 58.1	10 12 41.7	0.03019	25.5	124 34 40.7	22 24 17.1	
15.75	78 12 18.6	10 21 49.9		25.75	125 0 35.6	22 43 49.2	
16.0	80 47 40.7	10 32 11.2		26.0	125 25 37.5	23 3 14.8	
16.25	83 16 49.4	10 43 40.4		26.25	125 49 49.3	23 22 33.7	
16.5	85 39 35.2	10 56 11.9	0.03619	26.5	126 13 13.4	23 41 45.7	0.10789
16.75	87 55 55.6	11 9 40.8		26.75	126 35 52.0	24 0 50.6	
17.0	90 5 52.3	11 24 2.2		27.0	126 57 47.5	24 19 48.3	
17.25	92 9 31.8	11 39 10.7		27.25	127 19 1.9	24 38 38.9	
17.5	94 7 3.3	11 55 2.5	0.04250	27.5	127 39 37.4	24 57 22.0	
17.75	95 58 38.9	12 11 32.6		28.0	128 18 58.5	25 34 25.9	
18.0	97 44 32.2	12 28 37.8		28.5	128 56 3.8	26 10 59.3	0.12336
18.25	99 24 58.3	12 46 13.6		29.0	129 31 5.4	26 47 2.2	
18.5	101 0 12.7	13 4 17.0	0.04907	29.5	130 4 13.8	27 22 33.9	
18.75	102 30 31.1	13 22 44.4		30.0	130 35 38.5	27 57 34.7	
19.0	103 56 9.8	13 41 33.3		30.5	131 5 28.2	28 32 4.2	0.13881
19.25	105 17 25.0	14 0 40.5		31.0	131 33 50.3	29 6 2.7	
19.5	106 34 31.5	14 20 4.1	0.05590	31.5	132 0 52.0	29 39 30.3	
19.75	107 47 43.5	14 39 41.5		June 1.0	132 26 39.3	30 12 27.3	

Date, 1877.	Geocentric R.A.	Geocentric N.P.D.	Log. Dist. from Earth.	Date, 1877.	Geocentric R.A.	Geocentric N.P.D.	Log. Dist. from Earth.
June 1.5	132 51 17.7	30 44 53.8	0.15417	June 19.5	141 22 49.0	45 32 18.0	0.27842
2.0	133 14 52.5	31 16 49.9		20.5	141 40 51.4	46 9 5 9	
2.5	133 37 28.1	31 48 16.2		21.5	141 58 22.6	46 44 54.8	
3.0	133 59 8.8	32 19 13.2		22.5	142 15 25.2	47 19 47.2	
3.5	134 19 58.5	32 49 41.1	0.16931	23.5	142 32 1.3	47 53 45.2	0.30179
4.5	134 59 17.9	33 49 11.0		24.5	142 48 13.1	48 26 51.2	
5.5	135 35 51.4	34 46 49.5		25.5	143 4 2 1	48 59 7.2	
6.5	136 9 59.3	35 42 39.5		26.5	143 19 30.2	49 30 35.3	
7.5	136 41 58.7	36 36 45.3	0.19877	27.5	143 34 38.9	50 1 17.3	0.32362
8.5	137 12 4 6	37 29 10.9		28.5	143 49 29.6	50 31 15.0	
9.5	137 40 30.0	38 20 0.0		29.5	144 4 3.3	51 0 30.3	
10.5	138 7 25.7	39 9 16.0		30.5	144 18 21.4	51 29 4 7	
11.5	138 33 1.1	39 57 2.5	0.22687	July 1.5	144 32 24.7	51 56 59.9	0.34399
12.5	138 57 24.4	40 43 23.2		2.5	144 46 14.6	52 24 17.5	
13.5	139 20 42.5	41 28 21.5		3.5	144 59 51.4	52 50 58.6	
14.5	139 43 2.0	42 12 0.7		4.5	145 13 16.1	53 17 4.8	
15.5	140 4 28.1	42 54 23.9	0.25343	5.5	145 26 29.5	53 42 37.1	0.36296
16.5	140 25 5.8	43 35 34.3		6.5	145 39 32.5	54 7 36.8	
17.5	140 44 59.5	44 15 34.8		7.5	145 52 25.1	54 32 6.3	
18.5	141 4 12.9	44 54 28.5		8.5	146 5 8.0	54 56 4.8	

*Comparison of Observations of Comet (b) 1877 (Winnecke)  
with the foregoing Ephemeris.*

Date, 1877.	Computed Geocentric R.A.	Geocentric R.A. deduced from Obs.	C - O $d \alpha \cos \delta$	Computed Geocentric N.P.D.	Geocentric N.P.D. deduced from Obs.	C - O $d \Delta$
April 7	332 20 14.5	332 20 13.0	+ 1.4	72 46 51.7	72 46 51.6	- 0.1
11	333 15 38.7	333 15 39.8	- 1.0	67 30 50.5	67 30 56.9	- 6.4
16	334 42 49.9	334 42 34.7	+ 13.2	60 11 23.7	60 11 45.5	- 21.8
19	335 54 18.5	335 54 7.2	+ 9.3	55 0 51.4	55 1 13.7	- 22.3
19	335 54 48.5	335 54 30.6	+ 14.7	54 58 39.0	54 59 5.7	- 26.7
21	336 50 31.9	336 50 9.5	+ 17.5	51 24 40.7	51 25 5.5	- 24.8
21	336 51 0.5	336 50 32.7	+ 21.7	51 22 53.7	51 23 16.4	- 22.7
22	337 24 39.3	337 24 9.9	+ 22.4	49 24 2.6	49 24 35.5	- 32.9
23	337 58 49.8	337 58 29.8	+ 14.7	47 31 17.1	47 31 44.5	- 27.4
23	337 59 30.6	337 59 14.4	+ 11.9	47 29 3.2	47 29 33.0	- 29.8
24	338 36 41.4	338 36 10.2	+ 22.3	45 34 16.7	45 34 48.5	- 31.8
24	338 37 13.1	338 36 42.1	+ 22.1	45 32 42.6	45 33 9.3	- 26.7
26	340 8 43.0	340 8 21.2	+ 14.4	41 21 52.0	41 22 16.1	- 24.1
26	340 9 41.0	340 9 12.8	+ 18.6	41 19 26.5	41 19 49.4	- 22.9
May 3	349 15 15.9	349 14 54.0	+ 9.7	26 16 49.7	26 16 48.8	+ 0.9



Date, 1877.	Computed Geocentric R.A.	Geocentric R.A. deduced from Obs.	$C - O$ $d \alpha \cos \delta$	Computed Geocentric N.P.D.	Geocentric N.P.D. deduced from Obs.	$C - O$ $d \Delta$
	"	"	"	"	"	"
May 4	351 44 14.7	351 44 0.1	+ 5.9	23 53 9.5	23 53 7.0	+ 2.5
4	351 46 7.2	351 45 48.5	+ 7.6	23 51 31.2	23 51 34.6	- 3.4
5	354 7 8.6	354 6 57.4	+ 4.1	21 59 35.1	21 59 34.4	+ 0.7
5	354 11 36.5	354 11 23.9	+ 4.7	21 55 24.3	21 55 20.1	+ 4.2
7	1 10 22.8	1 10 19.4	+ 1.0	17 52 34.3	17 52 19.5	+ 14.8
7	1 17 35.6	1 17 32.3	+ 1.0	17 49 15.0	7 49 8.1	+ 6.9
15	74 26 10.6	74 28 51.3	- 28.4	10 9 32.2	10 9 41.6	- 9.4
15	74 33 5.6	74 37 2.5	- 41.9	10 9 48.1	10 9 54.9	- 6.8
17	93 14 20.9	93 18 34.0	- 51.8	11 47 45.1	11 48 16.7	- 31.6
17	93 22 42.2	93 26 38.4	- 48.4	11 48 53.3	11 49 38.6	- 45.3
24	122 31 4.5	122 33 25.0	- 50.4	20 58 31.6	20 59 55.4	- 1 23.8
24	122 32 39.8	122 34 50.2	- 46.7	20 59 33.2	21 1 9.0	- 1 35.8
26	126 4 5.1	126 5 30.8	- 34.3	23 34 12.3	23 35 39.7	- 1 27.4
26	126 6 5.2	126 7 16.3	- 28.5	23 35 51.2	23 37 12.7	- 1 21.5
28	128 49 18.6	128 50 26.8	- 30.0	26 4 13.1	26 5 41.2	- 1 28.1
28	128 51 7.2	128 52 26.8	- 36.5	26 6 1.6	26 7 31.7	- 1 30.1
29	129 57 33.0	129 58 35.1	- 28.5	27 15 17.9	27 16 53.9	- 1 36.0
30	130 59 19.7	131 0 18.2	- 27.9	28 24 49.8	28 26 16.1	- 1 26.3
30	131 0 13.3	131 0 58.4	- 21.5	28 25 54.7	28 27 22.8	- 1 28.1
June 4	134 57 2.7	134 57 17.7	- 8.4	33 45 42.5	33 47 30.5	- 1 48.0
5	135 33 8.4	135 33 28.9	- 11.7	34 42 28.3	34 44 15.5	- 1 47.2
5	135 33 43.4	135 34 0.5	- 9.7	34 43 24.4	34 45 14.2	- 1 49.8
5	135 34 10.2	135 34 44.4	- 19.5	34 44 7.3	34 45 47.8	- 1 40.4
6	136 7 44.3	136 8 14.9	- 17.9	35 38 55.4	35 40 39.4	- 1 44.0
6	136 8 12.1	136 8 38.4	- 15.3	35 39 41.5	35 41 27.6	- 1 46.1
8	137 11 13.3	137 11 44.4	- 19.0	37 27 42.1	37 29 33.6	- 1 51.5
9	137 38 48.0	137 39 22.5	- 21.4	38 16 55.3	38 18 47.6	- 1 52.3
9	137 39 22.2	137 39 52.6	- 18.8	38 17 47.2	38 19 42.7	- 1 55.5
10	138 5 24.6	138 5 43.6	- 12.0	39 5 32.4	39 7 18.9	- 1 46.5
14	139 41 38.9	139 41 49.2	- 6.9	42 9 36.7	42 11 28.1	- 1 51.4
14	139 42 10.9	139 42 27.9	- 11.4	42 10 19.8	42 12 15.7	- 1 55.9
15	140 2 51.7	140 3 3.9	- 8.6	42 51 12.4	42 53 5.8	- 1 53.4
15	140 3 15.1	140 3 47.8	- 15.5	42 51 58.9	42 53 51.7	- 1 52.8
16	140 23 46.6	140 24 1.4	- 10.2	43 32 55.8	43 34 45.1	- 1 49.3
16	140 24 7.0	140 24 21.0	- 9.6	43 33 56.3	43 35 37.2	- 1 40.9
17	140 43 43.9	140 44 8.1	- 16.9	44 13 2.2	44 14 51.8	- 1 49.6
19	141 21 40.3	141 21 53.3	- 9.3	45 29 58.3	45 31 51.3	- 1 53.0
20	141 39 43.5	141 40 1.6	- 13.0	46 6 47.5	46 8 30.4	- 1 42.9
25	143 3 11.1	143 3 23.0	- 9.0	48 57 23.2	48 59 14.0	- 1 50.8
26	143 18 53.1	143 19 7.8	- 11.1	49 29 21.7	49 31 4.1	- 1 42.4

IV.

ELEMENTS OF THE ORBITS

OF

ξ URSÆ MAJORIS, 70 OPHIUCHI,

AND

$\mu^2$  BOÖTIS.



ELEMENTS OF  $\xi$  URSÆ MAJORIS.

Date of Perihelion Passage .....	$T$	1875.26
Period of Revolution .....	$P$	60.80 years
Position of Node .....	$\varnothing$	$100^{\circ} 13'$
Inclination of Orbit .....	$\gamma$	$56^{\circ} 40'$
Angle between Axis Major and Line of Nodes .....	$\lambda$	$235^{\circ} 0'$
Excentricity of Orbit .....	$e$	0.41590
Semi-axis Major .....	$a$	$2''.580$

## COMPARISON WITH INTERPOLATION CURVES.

Date.	Angle, from Interpolation Curve.	Computed Angle.	C — O.	Distance, from Interpolation Curve.	Computed Distance.	C — O.
	$^{\circ}$	$^{\circ}$	$^{\circ}$	"	"	"
1819.0	277.5	275.6	— 1.9	...	...	...
1822.0	260.2	258.2	— 2.0	...	...	...
1825.0	242.7	240.8	— 1.9	1.7	1.77	+ 0.07
1828.0	222.9	221.9	— 1.0	1.65	1.69	+ 0.04
1831.0	203.0	202.0	— 1.0	1.66	1.69	+ 0.03
1834.0	182.8	183.3	+ 0.5	1.80	1.79	— 0.01
1837.0	167.5	167.2	— 0.3	1.93	1.98	+ 0.05
1840.0	154.9	154.3	— 0.6	2.17	2.21	+ 0.04
1843.0	144.2	143.9	— 0.3	2.42	2.46	+ 0.04
1844.0	140.8	140.6	— 0.2	2.50	2.52	+ 0.02
1846.0	135.1	135.4	+ 0.3	2.65	2.69	+ 0.04
1847.0	132.2	132.6	+ 0.4	2.73	2.74	+ 0.01
1850.0	125.6	125.8	+ 0.2	2.91	2.91	0.00
1853.0	119.7	120.0	+ 0.3	3.02	3.02	0.00
1856.0	113.0	113.2	+ 0.2	3.06	3.05	— 0.01
1859.0	106.6	106.8	+ 0.2	2.96	2.98	+ 0.02
1862.0	100.2	100.2	0.0	2.80	2.76	— 0.04
1865.0	91.8	91.1	— 0.7	2.36	2.40	+ 0.04
1868.0	79.2	78.2	— 1.0	1.83	1.86	+ 0.03
1871.0	51.4	51.5	+ 0.1	1.30	1.20	— 0.10
1875.0	319.0	319.4	+ 0.4	1.03	1.11	+ 0.08
1878.0	288.3	287.9	— 0.4	1.58	1.59	+ 0.01

ELEMENTS OF 70 OPHIUCHI.

$T$ .....	1808.90		$\gamma$ .....	58 <sup>1</sup> / <sub>5</sub>
$P$ .....	94 44 years		$\lambda$ .....	151 55
	° ,		$c$ .....	0.46718
$\delta$ .....	127 23		$a$ .....	4''.790

Date.	Angle, from Interpolation Curve.	Computed Angle.	C — O.	Distance, from Interpolation Curve.	Computed Distance.	C — O.
	°	°	°	"	"	"
1780.0	85.9	86.1	+ 0.2	...	...	...
1790.0	51.0	51.0	— 0.1	...	...	...
1800.0	344.7	344.7	0.0	...	...	...
1805.0	315.9	315.8	— 0.1	...	...	...
1810.0	284.0	282.4	— 1.6	...	...	...
1815.0	213.3	214.5	+ 1.2	...	...	...
1820.0	165.7	165.9	+ 0.2	...	...	...
1825.0	148.8	148.0	— 0.8	4.01	4.10	+ 0.09
1830.0	138.1	138.5	+ 0.4	5.08	5.13	+ 0.05
1835.0	130.7	132.0	+ 1.3	5.89	5.86	— 0.03
1840.0	125.8	126.6	+ 0.8	6.42	6.34	— 0.08
1845.0	121.9	121.9	0.0	6.69	6.58	— 0.11
1850.0	117.7	117.4	— 0.3	6.72	6.62	— 0.10
1855.0	113.0	112.7	— 0.3	6.54	6.45	— 0.09
1860.0	107.8	107.6	— 0.2	6.16	6.12	— 0.04
1865.0	102.5	101.8	— 0.7	5.59	5.56	— 0.03
1870.0	94.7	94.5	— 0.2	4.87	4.97	+ 0.10
1875.0	84.8	84.8	0.0	4.03	4.21	+ 0.18
1877.65	78.1	77.7	— 0.4	3.58	3.76	+ 0.18

ELEMENTS OF  $\mu^2$  BOÖTIS.

$T$ .....	1862.55	$\gamma$ .....	$35^\circ 12'$
$P$ .....	266.0 years	$\lambda$ .....	$40^\circ 54'$
$\varpi$ .....	$166^\circ 7'$	$e$ .....	0.56685
		$a$ .....	$1''.057$

Date.	Angle, from Interpolation Curve.	Computed Angle.	C — O.	Distance, from Interpolation Curve.	Computed Distance.	C — O.
	$^\circ$	$^\circ$	$^\circ$	"	"	"
1780	358.3	359.6	+ 1.3	...	...	...
1790	353.9	354.5	+ 0.6	...	...	...
1795	349.3	351.8	+ 2.5	...	...	...
1800	347.7	348.9	+ 1.2	...	...	...
1805	344.6	346.7	+ 2.1	...	...	...
1810	341.5	343.2	+ 1.7	1.18	1.189	+ 0.01
1815	338.3	338.5	+ 0.2	1.14	1.121	— 0.02
1820	334.8	334.1	— 0.7	1.05	1.047	0.00
1825	329.9	329.0	— 0.9	0.976	0.966	— 0.010
1830	324.5	323.0	— 1.5	0.890	0.876	— 0.014
1835	317.5	315.5	— 2.0	0.791	0.779	— 0.012
1840	308.6	305.8	— 2.8	0.672	0.661	— 0.011
1845	293.1	292.5	— 0.6	0.568	0.572	+ 0.004
1850	273.3	273.7	+ 0.4	0.477	0.479	+ 0.002
1855	247.2	247.6	+ 0.4	0.421	0.417	— 0.004
1860	217.2	215.8	— 1.4	0.402	0.412	+ 0.010
1865	187.7	188.4	+ 0.7	0.436	0.447	+ 0.011
1870	164.7	165.6	+ 0.9	0.484	0.503	+ 0.019
1875	147.4	147.4	0.0	0.525	0.557	+ 0.032



